UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WISCONSIN

SECURITIES AND EXCHANGE COMMISSION, Plaintiff, v. EDWARD S. WALCZAK Defendant.	Case No. 3:20-cv-00076

EXPERT REPORT OF NEIL D. PEARSON

August 31, 2021

I. INTRODUCTION

A. Qualifications

1. My name is Neil D. Pearson. I am the Harry A. Brandt Distinguished Professor of Financial Markets and Options at the University of Illinois at Urbana-Champaign, where I teach courses on derivative financial instruments (including options) and the measurement of financial risks and conduct research on various issues in financial markets.[1] Before joining the University of Illinois, I was on the faculty of the University of Rochester, in Rochester, NY. From July 1994 through June 1995, I was on leave from the University of Rochester and served as a visiting academic in the Office of Economic Analysis at the U.S. Securities and Exchange Commission. At the SEC, I worked on a policy proposal regarding the measurement and disclosure of financial risks, and I also assisted the Division of Enforcement with several investigations involving derivative financial instruments and financial fraud. During the 2008-2009 academic year, I held an appointment as a Visiting Professor at the Massachusetts Institute of Technology. During the Fall of 2013, I was a Special Term Professor at the School of Economics and Management at Tsinghua University in Beijing. Since the summer of 2019, I have been a Research Fellow of the Canadian Derivatives Institute (Institut canadien des dérivés) based in Montréal, Québec.

2. I am on the editorial board (Associate Editor) of the Journal of Financial and Quantitative Analysis, a general interest academic finance journal, and recently ended a term of more than 25 years as an Associate Editor of the Journal of Financial Economics, another

[1] Derivative financial instruments, also referred to as financial derivatives, are financial instruments for which the cash flows or other payoffs are based on the prices of other financial instruments, foreign currencies, or commodities, or on interest rates quoted in financial markets. Options on futures contracts, that is options giving the right to buy or sell futures contracts at fixed prices, are examples of financial derivatives because their payoffs depend on the prices of futures contracts.

leading academic finance journal. I am also on the editorial board of the Journal of Risk, a specialty journal in risk management, and recently completed ten years as an Associate Editor of Economics Bulletin. I regularly act as a referee (reviewer) for other peer-reviewed academic journals in finance and economics.

3. I have published more than 30 academic articles in refereed journals, a number of book chapters and other non-refereed publications, and one book on risk measurement methods.

4. I am affiliated with the risk management consultancy Rutter Associates of New York, NY. My consulting work through Rutter Associates focuses on the valuation and hedging of derivative financial instruments and on the measurement and management of market and credit risk. I have also worked on other consulting assignments, not through Rutter Associates, involving the valuation of derivative financial instruments and trading strategies that utilize such instruments.

5. I am currently helping the data vendor AlgoSeek LLC with their "Open Source Options Greeks Project" that will allow them to offer nearly real-time options analytics to their institutional clients.

6. The bulk of my teaching, research, and consulting involves either derivative financial instruments or techniques to measure financial risks. Throughout my academic career I have taught, and I continue to teach, courses on derivative financial instruments, including options, futures contracts, and options on futures contracts. I have taught a course on financial risk management that focuses on techniques to measure financial risk every spring since 2010. In addition, the bulk of my work with Rutter Associates, for various clients, has involved either the measurement and management of financial risks or the valuation of financial derivatives.

7. I earned a B.A. in Economics, summa cum laude, from Princeton University in 1981, and a Ph.D. in Management (specializing in Finance) from the Massachusetts Institute of Technology in 1990.

8. My publications during the most recent 10 years are listed on my curriculum vitae, a copy of which is attached as **Exhibit 1**. My curriculum vitae also describes my qualifications in more detail. My previous activities as an expert witness are listed in **Exhibit 2**.

B. Materials Considered

9. The facts and data that I considered in forming the opinions expressed in this report are listed in **Exhibit 3**.

10. My opinions are also based on my own educational and professional experience and background, including that listed in my curriculum vitae.

C. Summary of Assignment

11. My assignment involves the assessment of the risks of the futures options held by the Catalyst Hedged Futures Strategy Fund (the "Fund") during the period running from November 1, 2016 through February 28, 2017. This assessment included replicating the stress tests purportedly carried out by the portfolio manager, Edward Walczak. During the period, the Fund held large positions in a number of different options based on Standard & Poor's (S&P) 500 index futures contracts. The Fund also held positions in money market funds, short-term notes and bonds, and other low-risk fixed income instruments. I focus on the Fund's options positions because they were responsible for almost all of the Fund's risk during the period running from November 1, 2016 through February 28, 2017. The aggregate net asset value (NAV) of the Fund was approximately $4.184 billion on November 1, 2016 and $3.064 billion on February 28, 2017.

12. According to Mr. Walczak, he used a computer program known as OptionVue to assess the risk of the Fund's options positions. OptionVue allows the user to input information on trades in options and other financial instruments. Based on the trades, the computer program then determines the user's holdings at each point in time. OptionVue can then compute the current value and projected future values of the portfolio at several time horizons for various assumptions about the prices of the options' underlying financial instruments (which in this case are S&P 500 index futures contracts) and the options' volatilities.

13. During 2014, 2015, and 2016, Mr. Walczak participated in a series of telephone conferences with investment advisers who either had invested in the Fund on behalf of their clients or were considering investing in the Fund (the "Open House Calls"). During multiple Open House Calls Mr. Walczak explained how he used OptionVue to assess the risks of the Fund's options positions. In particular, he repeatedly represented that he used OptionVue to stress test the Fund's options positions, which he described as using OptionVue to calculate the projected losses to the Fund in specific scenarios defined by assumptions about changes in the prices of the S&P 500 index futures contracts, options volatilities, and the time horizon.[2] Mr. Walczak also represented that when the OptionVue results showed that the projected losses in one or more of his stress scenarios were greater than 8% of the Fund's NAV, he would hedge the portfolio, that is execute additional options trades, to eliminate the possibility of a drawdown greater than approximately 8% of the Fund's NAV.

[2] Unless I indicate otherwise, I measure the gain or loss as the change in the market value of the Fund's options positions. For example, if the market value of the Fund's options positions was $200 million on one day and then $175 million on the next day, the gain from the first day to the second day is $175 million – $200 million = –$25 million. The loss is the negative of the gain, or $25 million.

14. The SEC staff asked me to use OptionVue to replicate the analyses of the Fund's options positions that Mr. Walczak represented he carried out. In particular, the SEC staff asked me to use OptionVue, together with the Fund's options positions during the period running from November 1, 2016 through February 28, 2017, to estimate the losses in the specific stress scenarios that Mr. Walczak represented he considered. The SEC asked me to then form opinions as to whether:

a. the projected losses in any of the scenarios Mr. Walczak represented he considered ever exceeded 8% of the Fund's NAV;

b. for days on which the projected losses in one or more of the scenarios exceeded 8% of the Fund's NAV, whether Mr. Walczak traded options; and

c. for days on which the projected losses in one or more of the scenarios exceeded 8% of the Fund's NAV and Mr. Walczak traded options, form an opinion as to whether the options trades served to reduce or increase the risk of the Fund.

The SEC staff also asked me to form opinions as to several additional matters, including:

d. whether the other risk parameters that Mr. Walczak purportedly used in addition to the OptionVue analysis meaningfully measured the Fund's risk;

e. whether the periods in December 2016 and February 2017 during which the Fund experienced large losses were periods of unusual or extreme market movements; and

f. whether the Fund's risk during the period running from November 1, 2016 through February 28, 2017 was consistent with its stated investment

objective of "capital appreciation and capital preservation in all market conditions, with low volatility and low correlation to the US equity market."[3]

15. I am independent of the SEC in this matter. My consulting rate is $600 per hour. My fees in this engagement are not in any way dependent on or contingent upon my findings or the outcome of this matter.

D. Summary of Opinions

16. A summary of my opinions is as follows:

a. I used OptionVue to analyze the stress scenarios Mr. Walczak represented he considered for every day during the period running from November 1, 2016 through February 28, 2017, excluding the week of December 12-16.[4] I developed another computer program to analyze the stress scenarios during the week of December 12-16. My analysis shows that there were scenarios for which the projected losses exceeded 8% of the Fund's NAV for every day during the period running from November 1, 2016 to February 14, 2017. The projected losses in some stress scenarios were far in excess of 8% of the Fund's NAV for most of the days I analyzed.

b. During the period running from November 1, 2016 to February 14, 2017, there were 72 days on which the projected losses in one or more stress

[3] Catalyst Hedged Futures Strategy Fund Summary Prospectus (November 1, 2016), p. 1.

[4] I was not able to use OptionVue to analyze the Fund's portfolio during the week of December 12-16 because OptionVue's archive of historical prices contains some incorrect prices during this week.

scenarios exceeded 8% of the Fund's NAV. Mr. Walczak did not trade on 22 of those 72 days.

c. On most of the days for which the losses in one of more of the scenarios exceeded 8% of the Fund's NAV and Mr. Walczak traded options, his trades had little impact on the Fund's risk. There were only two periods when Mr. Walczak executed trades that significantly reduced the Fund's risk, December 9-14, 2016 and February 13-15, 2017. Both of these periods were shortly *after* the Fund suffered significant loses. Thus, these trades were not executed proactively in anticipation of avoiding those losses.

d. My calculations of the projected losses are conservative because on each date I measure the loss starting from the current portfolio value. In contrast, Mr. Walczak represented that he sought to limit the drawdowns from the Fund's high-water mark, which is the highest Fund value ever achieved.

e. Contrary to his representations, Mr. Walczak did not act to "flatten" or eliminate the Fund's risk when the drawdown reached 8% on February 9, 2017.

In addition:

f. None of the other risk parameters that Mr. Walczak purportedly used in addition to the OptionVue scenarios were forward-looking or prospective, and they did not meaningfully measure the Fund's risk. None of them, either individually or in aggregate, served as portfolio stop-loss measures.

g. The periods in December 2016 and February 2017 during which the Fund experienced large losses were not periods of unusual or extreme market movements.

h. The Fund's risk was inconsistent with the stated investment objective of "capital appreciation and preservation in all market conditions, with low volatility and low correlation to the US equity market."[5] Rather, the Fund was extremely risky, highly volatile, and highly negatively correlated with the US equity market, during December 2016, January 2017, and February 2017. Mr. Walczak knew or should have known this.

II. BACKGROUND

A. Futures, Options, and Options on Futures

17. A futures contract is as an agreement to buy or sell a particular commodity or asset at a predetermined price at a specified time in the future. The buyer of a futures contract takes on the obligation to buy the underlying asset or commodity when the futures contract expires. The seller of the futures contract takes on the obligation to sell the underlying asset or commodity on the expiration date. Buyers and sellers of futures contracts provide collateral, called margin, to ensure that they will meet their obligations under the contracts. Futures contracts trade on futures exchanges somewhat similarly to the way stocks trade on stock exchanges.

[5] Catalyst Hedged Futures Strategy Fund Summary Prospectus (November 1, 2016), p. 1.

18. One important and actively traded futures contract is based on the S&P 500 stock index and traded on the Chicago Mercantile Exchange (CME). In this contract the buyer (seller) does not buy (sell) the S&P 500 stock index on the delivery date but rather receives (makes) a cash payment equal to 250 times the value of the index. The price of this futures contract closely tracks the S&P 500 stock index. Buyers of the S&P 500 futures contract experience gains or losses that are approximately equal to the gains or losses they would experience by investing in the portfolio of stocks that tracks the S&P 500 index. Sellers experience gains and losses that are the negative of the gains or losses experienced by the buyers. Thus, sellers benefit when the stock market declines and suffer losses when the stock index rises. Stock index futures contracts such as the CME's S&P 500 contract are appealing to many investors because they provide an easy and convenient way for investors to gain or hedge exposure to the stock market.

19. Options are another kind of financial instrument. There are two kinds of options, call options and put options, and for each kind, two different exercise styles. A call option gives the holder the right to buy an underlying financial instrument (for example, a stock or a futures contract) at a fixed price, called the strike price, either on, or alternatively, on or before, a specified date, termed the expiration date. A put option gives the holder the right to sell the underlying financial instrument in exchange for the strike price either on or on or before the expiration date. Buying or selling the underlying financial instrument in exchange for the strike price is referred to as exercising the option. Options that may be exercised only on the

expiration date are termed European, while options that may be exercised on or before the expiration date are termed American.[6]

20. A call option will ordinarily only be exercised if the price of the underlying financial instrument exceeds the option strike price, in which case the per-unit exercise value or payoff is the difference between the price of the underlying financial instrument and the strike price. In mathematical symbols, the exercise value of a call per unit of the underlying financial instrument is $S_T - K$, where S_T is the price of the underlying financial instrument on the exercise date and K is the strike price. This reflects the fact that the option holder who exercises a call option on date T receives the underlying financial instrument with price S_T and pays the strike price K. When the price of the underlying financial instrument is less than the strike price, the call option is not exercised and the payoff is zero. A put option will ordinarily only be exercised if the underlying financial instrument price is less than the strike price, in which case the per-unit exercise value or payoff is the difference between the strike price and the price of the underlying financial instrument. In mathematical symbols, for a put option the per-unit exercise value is $K - S_T$, reflecting the fact that the option holder who exercises a put option on date T receives the strike price K and delivers the underlying financial instrument with price S_T. When the price of the underlying financial instrument is greater than the strike price, the put option is not exercised and the payoff is zero.

21. Options can be based on stocks, futures contracts, or in some cases, other financial instruments. Stock options are traded on options exchanges that operate somewhat similarly to stock exchanges. Options on futures contracts, often referred to as futures options,

[6] The terminology American and European is unrelated to where the options contracts are traded. Options with both American and European-style exercise trade in the U.S., Europe, and other countries.

are traded on futures exchanges. One important futures option is the S&P 500 futures option based on the S&P 500 stock index futures contract. Because the underlying futures price tracks the S&P 500 index, this options contract ultimately is based on the S&P 500 index and provides exposure to changes in the value of that index.

22. When options are trading (that is, prior to their exercise or expiration), their prices are related to the prices of their underlying financial instruments because expected future prices of financial instruments, and thus option payoffs, are related to current financial instrument prices. For example, the prices of call (put) options based on the S&P 500 index futures contract rise (fall) when the S&P 500 futures prices rises (falls). Because the S&P 500 futures price closely tracks the index, the prices of the call (put) options rise (fall) when the S&P 500 index rises (falls).

23. The S&P 500 futures options trade on the CME. On each trading date, typically a large number of options that differ in terms of their expiration dates and strike prices are available for trading. During the period relevant to my analysis, the Fund traded only options that expired either during the third week of the month or on the last trading day of the month. The options that expire during the third week of March, June, September, and December were the first S&P 500 futures options made available for trading by the CME, and are referred to as "standard" options. Those options expire shortly after the close of trading on the Thursday before the third Friday of each March, June, September, and December. Subsequently, the CME opened trading in options that expire shortly after the close of trading on the third Fridays of the other months, referred to as "Week 3" options, and in options that expire on the last

trading date of each month.[7] For each expiration date, options with many different strike prices are typically available for trading. For example, on June 11, 2021, standard S&P 500 futures options expiring during the third week of September 2021 with 343 different strike prices were available for trading.

24. As explained above, changes in the prices of the S&P 500 call and put futures options rise and fall with changes in the prices of the underlying futures contracts, which in turn follow the S&P 500 index. In addition, the prices of these options depend upon their strike prices, the time remaining to expiration, the volatility of the underlying futures price,[8] and the risk-free interest rate.[9,10] Call options for which the underlying futures price exceeds the strike price are referred to as "in-the-money" because there would be a positive payoff if the call options were to be exercised immediately, while those for which the futures price is less than the strike price are referred to as "out-of-the-money." Put options for which the futures price exceeds the strike price are referred to as "out-of-the-money," while those for which the underlying futures price is less than the strike price are referred to as "in-the-money." Options

[7] There are also weekly options that expire shortly after the close of trading on the Fridays of weeks other than the third week of the month. In addition, there are Monday and Wednesday options that expire on the Monday and Wednesday of each week, respectively.

[8] The volatility is the standard deviation of the continuously compounded rate of return on the underlying futures price.

[9] Options prices depend upon options strike prices because both the call and put options exercise payoffs $S_T - K$ and $K - S_T$ depend on the strike price Whether it is optimal to exercise an option also depends on the strike price. Volatility measures the dispersion of possible future prices of the underlying financial instrument; it affects current options prices because the dispersion of possible future underlying instruments prices affects the possible options payoffs. Similarly, the time remaining to expiration affects the dispersion of possible future underlying instrument prices and thus the possible options payoffs because large changes in the prices of underlying financial instruments are more likely the longer is the time remaining to an option's expiration. The interest rate determines the discount rate used to discount the option payoff.

[10] See, for example, John C. Hull, Options, Futures, and Other Derivatives (9th ed.), Upper Saddle River, NJ: Pearson Education, Inc. (2015), Chapter 11; and John C. Cox and Mark Rubinstein, Options Markets, Englewood Cliffs, NJ: Prentice-Hall (1985), Chapter 2. Many of the properties of option prices were first derived in the seminal paper by Robert C. Merton (co-winner of the 1997 Nobel Prize in Economic Sciences) titled "Theory of Rational Option Pricing," Bell Journal of Economics and Management Science 4 (1973), pp. 141-183.

for which the strike price equals the underlying futures price are referred to as "at-the-money." Generally, in-the-money options are more sensitive to changes in the price of the underlying financial instrument than out-of-the-money options.

25. If an investor sells an option, and that option is exercised by the buyer, the payoff to the investor who sold the option is the negative of the payoff to the investor who bought the option. Thus, the payoff to an investor who sells an option is either zero (if the option is not exercised by the buyer) or negative (if the option is exercised by the buyer). Investors who sell options benefit when the options they sell expire out-of-the-money and are not exercised by the buyers. In this case, they receive the price of the option, also referred to as option premium, when they sell it, and do not have to make any payments when the option expires unused.

26. Investors often execute trades in more than one option at the same time. For example, it is common for an investor to buy call (put) options with one strike price and expiration date, and simultaneously sell call (put) options with a different strike price and/or expiration date. Such trades are termed call (put) "spreads."

27. The relation between options prices and the prices of their underlying assets has been thoroughly studied since the publication of the Black-Scholes-Merton formula in 1973, the Black futures options pricing formula in 1976, and the binomial options pricing model in 1979.[11] Since then there have been a great many academic papers extending the Black-Scholes-

[11] Fisher Black and Myron Scholes, "The Pricing of Options and Corporate Liabilities," Journal of Political Economy 81 (1973), pp. 637-654; Robert C. Merton, "Theory of Rational Option Pricing," Bell Journal of Economics and Management Science 4 (1973), pp. 141-183; Fischer Black, "The Pricing of Commodity Contracts," Journal of Financial Economics, 3 (1976), pp. 167-179; and John C. Cox, Stephen A. Ross, and Mark Rubinstein, "Option Pricing: A Simplified Approach," Journal of Financial Economics 9 (1979), pp. 229-263.

Merton analysis to develop related options pricing models, applying the Black-Scholes-Merton formula or related models to the options markets, and exploring the relationship between options prices and underlying financial instrument prices. Textbooks on options and other derivatives cover these models.[12]

28. Options pricing models that capture the relation between options prices, their underlying financial instruments prices, and the other determinants of options prices are widely used by financial market participants. Among other uses, options pricing models are used by many market participants to determine the sensitivity of options prices to the prices of their underlying assets and to changes in volatility. The sensitivity of the price of an option or value of an options portfolio to the price of the underlying asset is referred to as the "delta."[13] The delta of an options position indicates the amount by which the value of the options position will change when the price of the underlying financial instrument changes by $1.[14] For example, if the delta of an S&P 500 futures options is 125 then the value of the options contract will increase or decrease by $125 if the futures price increases or decreases by $1, respectively.

[12] For example, John C. Hull, Options, Futures, and Other Derivatives (9th ed.), Upper Saddle River, NJ: Pearson Education, Inc. (2015); Robert L. MacDonald, Derivatives Markets (3rd ed.), Upper Saddle River, NJ: Prentice-Hall (2013); John C. Cox and Mark Rubinstein, Options Markets, Englewood Cliffs, NJ: Prentice-Hall (1985); and Paul Wilmott, Derivatives: The Theory and Practice of Financial Engineering, New York: John Wiley & Sons (1998).

[13] See, for example, Chapter 19 of the textbook by John C. Hull, Options, Futures, and Other Derivatives (9th ed.), Upper Saddle River, NJ: Pearson Education, Inc. (2015); and Chapter 5 of Robert L. MacDonald, Derivatives Markets (3rd ed.), Upper Saddle River, NJ: Prentice Hall (2013).

[14] The relation is exact only for small changes in the price of the underlying financial instrument. Mr. Walczak and Mr. Schoonover defined delta slightly differently. Specifically, they defined delta to be the percentage change in the Fund's NAV resulting from a percentage movement in the S&P 500 index. According to this definition, if NAV would increase by 3.3% when the S&P 500 index increased by 1% then the delta is 3.3%/1% = 3.3. If the NAV would decrease by 3.3% when the S&P 500 index increased by 1% then the delta is –3.3%/1% = –3.3. See 10/27/2017 Walczak Investigative Testimony Tr. at 42:2-43:5; 4/4/2018 Walczak Investigative Testimony Tr. at 612:17-22; and 4/12/2021 Schoonover Deposition Tr. at 40:19-41:12. Mr. Schoonover's spreadsheets reported the delta as a percentage, for example they reported –3.3 as –330%. See, for example, SEC_01_0000750.

29. The sensitivity of the price of an option or value of an options portfolio to changes in the volatility of the underlying asset is referred to as the "vega." The vega of an option or options position indicates the amount by which the value of the option or options position will change when the volatility changes by one percentage point, e.g. from 15% to 16%.

B. The Fund's Options Trades

30. During the period running from November 1, 2016 through February 28, 2017, the Fund had large positions in a number of different options based on the S&P 500 index futures contract. The Fund also held positions in money market funds, short-term notes and bonds, and other low-risk fixed income instruments.[15] The total net asset value (NAV) of the portfolio, including both the options and the fixed income instruments, was approximately $4.184 billion on November 1, 2016 and approximately $3.064 billion on February 28, 2017. I focus on the risks of the positions in futures options because they accounted for the bulk of the Fund's risk.

31. During the period running from November 1, 2016 through February 28, 2017, the Fund's options position consisted primarily of call options.[16] The Fund both purchased and sold call options, most commonly in the form of a trade known as a 1:3 ratio spread. In this

[15] The Fund's holdings of fixed income instruments consisted of several money market funds, U.S. Treasury notes and bonds with about three years or less remaining to maturity, the Vanguard short-term bond exchange-traded fund, and the Prime Meridian Income Fund, which invests in short-term consumer loan portfolios from creditworthy borrowers.

[16] The Fund executed a put trade (a diagonal spread) on November 1, 2016. These puts were out-of-the-money when they were traded, and became further out of the money as the S&P 500 index rose during December 2016 and January and February 2017. As a result, these put options had limited value and contributed little to the Fund's risk during the period running from November 1, 2016 through February 28, 2017. The Fund also traded some puts toward the end of February 2017. This was toward the end of the period the SEC staff asked me to consider, and as a result, these put option trades also have little impact on my analysis. That said, my analysis of the risks of the Fund's options portfolio reflects all of the options traded and held by the Fund, including the put options.

trade, the Fund would buy call options with a strike price above the current index value and sell call options with a strike price typically 50 points higher than the strike price of the purchased calls. The Fund would sell three times as many call options as it purchased, which explains why the trade is known as a 1:3 ratio spread. For example, on November 11, 2016, the Fund purchased 1,000 options based on the March 2017 S&P 500 futures price expiring on the third Friday of February 2017 (the February Week 3 options) with a strike price of 2,230, and sold 3,000 February Week 3 options with a strike price of 2,280. At the time of the trade the price of the March 2017 S&P 500 futures, the options' underlying financial instrument, was approximately 2,155.

32. **Exhibit 4** shows how the payoffs of the 1,000 purchased calls with a strike price of 2,230, the 3,000 sold calls with a strike price of 2,280, and the 1:3 ratio spread consisting of the 1,000 purchased calls and the 3,000 sold calls, depend on the price of the March 2017 S&P 500 index futures contract. The index futures price is shown on the horizontal axis. For futures prices less than or equal to 2,230, the futures price is less than the option strike prices. Thus, the options are not exercised and the payoffs are zero. If the futures price is between 2,230 and 2,280, the calls with a strike price of 2,230 are exercised and those with a strike price of 2,280 are not. This yields a per-unit payoff of $S - 2{,}230$, and a total payoff of $1{,}000 \times 250 \times (S - 2{,}230)$, where the 1,000 is the quantity of call options and the 250 reflects the fact that each call option is based on 250 times the index. If the futures price exceeds 2,280, the calls with strike prices of both 2,230 and 2,280 are exercised and the net payoff is $1{,}000 \times 250 \times (S - 2{,}230) - 3{,}000 \times 250 \times (S - 2{,}280)$. In this expression, the 3,000 is the quantity of call options with a strike price of 2,280 and the minus sign in front of the 3,000 reflects the fact that the options with a strike price of 2,280 are sold rather than purchased. The graph shows that the net payoff is positive when the futures prices is between 2,230 and 2,305, and negative when the futures

price exceeds 2,305. The net payoff reaches its maximum value when the futures price is 2,280. The net payoff becomes negative and large toward the right-hand side of the figure when the futures price becomes large. These negative payoffs occur because the amount owed on the 3,000 sold options with strike price 2,280, when they are exercised by the buyer, exceeds the amount received when the 1,000 purchased options with a strike price of 2,230 are exercised.

33. The profit or loss from the trade is the difference between the payoff and the initial net cost of the ratio spread, which is the difference between the amount paid for the options with a strike price of 2,230 and the amount received from selling the options with a strike price of 2,280. For this trade, the net cost was small and a graph of the profit would be similar to the graph of the payoff shown in Exhibit 4. The profit is maximized when the futures price is 2,280, and is large when the futures price is close to that level. In essence, this 1:3 ratio spread is a bet that the futures price will be close to 2,280 on the expiration date of the options. The figure also shows that the value (and thus the profit, because the profit approximately equals the value because the net cost of the position is small) is negative and large if the futures prices increases. An investor who enters into then 1:3 ratio spread accepts this risk in exchange for the possible gains that will be realized if the futures price is close to 2,280 on the expiration date of the options.

34. **Exhibit 5** shows the model value of the calls and the 1:3 ratio spread two weeks prior to expiration, where the model values are computed using the standard Black model for the value of a futures option, assuming that the volatility is 10% and the interest rate is 1% per year. The figure shows that, with two weeks remaining to expiration, the value of the ratio spread is largest when the futures price is between 2,240 and 2,245. The figure also shows that the value will become negative, that is there will be losses, if the futures price increases

sufficiently. This occurs because the ratio spread includes more sold options (3,000) than purchased options (1,000).

35. The Fund held positions in a number of ratio spreads on most days during the period running from November 1, 2016 through February 28, 2017, and often held other positions in calls. The Fund's total options positions were quite large. For example, on February 1, 2017, the Fund held purchased positions in 82,750 options and sold positions in 87,050 options. Each option was based on 250 times the index and the S&P 500 index closed at 2,279.55 on that day. Thus, the purchased options were ultimately based on stocks with a total value of 82,750 × 250 × 2,279.55 or approximately 47.2 billion dollars, while the written options were ultimately based on stocks with a total value of 87,050 × 250 × 2,279.55 = 49.6 billion dollars.

36. Because the Fund both bought and sold options, the net value of the options positions could be close to zero or even negative. In fact, the net value of the options position was negative on many days during the period running from November 1, 2016 through February 28, 2017. For example, on February 1, 2017, the net value of the options position was approximately negative $103 million. The risk of the options position is determined not by its net value, but rather by the possible *changes* in the net value.

III. ANALYSIS AND OPINIONS

A. The OptionVue Computer Program

37. OptionVue is a computer program that projects the values of options and options positions at different time horizons given assumptions about the price of the underlying financial instrument and options volatilities. According to Mr. Walczak, he used OptionVue to

help him select options to buy and sell, to project future values of the Fund's options positions, and to assess the risks of the Fund's options positions.[17]

38. OptionVue includes two important components, a "Matrix" that is used to display existing positions and enter trades, and an "Analyze" capability that calculates and then displays the current and projected values of the options portfolio based on various inputs and assumptions. The Matrix consists of a set of cells that either display information or can be used to enter information, and has an appearance similar to that of a computer spreadsheet.

39. OptionVue also includes a historical archive of market prices and a "BackTrader" capability that allows the user to go back in time to a past date and time and analyze a portfolio using the market data from that date and time. This capability allows an OptionVue user to go back in time and see the analyses that OptionVue would have performed on any selected past date and time. I used OptionVue's BackTrader to analyze the Fund's portfolio during the period running from November 1, 2016 through February 28, 2017, excluding the week of December 12-16, 2016.

40. **Exhibit 6** shows an example of a section of the Matrix displaying some of the Fund's options positions as of the morning of February 1, 2017. I created it using OptionVue

[17] The transcripts of Mr. Walczak's 4/4/2018 investigative testimony and his 7/27/2021 deposition contain many references to his use of OptionVue in managing the Fund's options portfolio. See 4/4/2018 Investigative Testimony Tr. at 523:13; 553:15; 585:16; 626:13,15; 627:2,8,21,25; 628:10, 24; 629:7, 10, 11, 13; 632:13; 635:13, 13, 19, 21, 23; 636:8, 20; 639:9, 14, 19, 20; 640:14, 24; 641:4,12; 649:15; 649:18, 23; 656:9, 12, 20, 21; 657:2, 7; 660:24; 661:2, 23; 662:1 663:12, 16; 664:7,17; 679:20 727:11,13 746:12; 747:12,13; 758:12; 760:6, 11; 760:16, 20; 761:20, 23; and 762:3, 11, 13, 20, 22. See also 7/27/2021 Walczak Deposition Tr. at 34:3, 8, 11, 15, 21; 35:15, 17; 36:17; 37:9, 25; 38:3, 8, 10, 16, 2;1 41:13; 41:22, 24; 43:23; 44:6; 46:6; 47:1, 2, 23; 52:14; 53:21; 54:18; 55:19, 20, 25; 56:12; 56:16, 20; 57:3, 5, 5, 24; 58:3; 64:4; 66:6; 67:4, 13; 68:13,14; 68:18, 21 73:8, 24; 4:3, 17; 74:18; 75:2; 76:18, 19; 78:14; 78:19; 80:17; 81:7, 23; 82:8; 82:20; 83:3; 84:17; 85:10; 86:12, 22; 8:4, 8, 17, 21; 89:2; 89:11, 15; 90:17, 20, 24; 91:5; 91:16; 93:19; 94:24; 95:3, 7, 8; 97:18, 20, 22, 23; 98:2, 6; 99:7; 99:14; 100:15; 101:10; 102:3; 102:14; 103:17; 107:7, 18; 108:16; 109:1, 4; 110:23; 111:23; 112:14; 115:7, 15, 17; 117:2, 9, 12, 16, 23; 120:8; 121:9; 122:3, 16, 22, 25; 123:2, 6, 7, 11, 24; 124:1, 3, 4; 124:7, 13, 17; 126:7, 12; 127:3, 4, 8, 11, 15; 128:18, 23; 129:3, 15; 135:19; 136:10; 137:16,17; 151:1, 6; 152:25; 158:7; 170:10, 25; 173:5, 16; 176:7, 9, 10, 12, 15; 178:12; 182:16; 188:17; 195:8, 10, 12; 195:13; 197:10; 199:4, 14; 202:15; 205:18; 211:7; 214:6; 216:9, 9; 225:11; 236:8; 268:1,3; and 269:15.

BackTrader by entering the date of Wednesday, February 1, 2017, and the time of 09:00 (9:00 am central time) into the BackTrader box, which is displayed at the top of the exhibit.

41. The top of the OptionVue display includes various buttons that can be used to display information or perform certain tasks. For example, the button labelled "Price" will cause OptionVue to display a price chart showing the history of the prices of the underlying asset, while the button labeled "Trade Log" causes OptionVue to display the history of trades entered into the OptionVue program. Below the various buttons, OptionVue displays the prices of the S&P 500 index futures contract (trading symbol SP) for the March, June, September, and December expiration dates.

42. The main part of the Matrix consists of a table that looks similar to a computer spreadsheet and displays information about the available options and the options positions that have been entered into OptionVue. The dark-shaded bar running across the top indicates the expiration dates. For example, the label "WKLY3 <17> (Feb 17)" indicates that the option is a Week 3 option that expires on the third Friday of the month, on February 17, and has 17 days remaining to expiration.[18] The left-hand column displays the option strike prices, and also a letter "C" or "P" indicating whether the option is a call or a put; for example, the "2280 C" indicates a call option with a strike price of 2,280. The columns headed "MktPr," "MIV," and "Delta" display the options' market prices, volatilities, and deltas as of the date and time shown in the "BackTrader" box, which in this case is 9:00 am on February 1, 2017. The cells below the columns headed "Trade" are used to enter options trades; these cells are empty because I was not in the process of entering trades when I created the exhibit. The columns headed "Ex.Pos" display the existing positions that have been entered into OptionVue using the

[18] The option expires after the close of trading on Friday, February 17, which is more than 16 but less than 17 days from 9:00 a m. on February 1. OptionVue reports the time to expiration as 17 days.

"Trade" column. Positive and negative entries indicate purchased and sold options, respectively. For example, in the row labelled "2280 C" and column "Ex.Pos," the entry of −11,000 indicates that the Fund has sold 11,000 of the February Week 3 call options with a strike price of 2,280.

43. The Matrix display also includes a button labelled "Analyze" located in the row immediately above the futures prices. If the user clicks the Analyze button, the OptionVue program calculates the projected future values of the options positions shown in the Matrix and presents the projections in the form of a graphical display or figure. OptionVue carries out this projection using reasonable approaches.[19]

44. **Exhibit 7** is an example of the graphical display that is created when OptionVue calculates the projected values of the options positions held by the Fund on the morning of February 1, 2017. The vertical axis is the value of the options positions and the horizontal axis displays a range of possible prices of the March 2017 S&P 500 index futures contract. The exhibit displays the projected position values as of 9:00 a.m. on February 1, 2017 for prices of the March 2017 futures contract between 2,160.80 and 2,394.20, that is from 5.3% below to 5.0% above the then current futures price of 2,281.[20] The vertical green line marks the location of the current futures price, which is 2,281. The large black dot that sits on the point where the vertical green line meets one of the dotted lines marks the current value of the portfolio.

[19] OptionVue computes the values of European futures options using a version of the Black-Scholes-Merton formula known as the Black model. This is a standard, well-accepted, and widely used model. It computes the values of American options using a proprietary model referred to as the Yates model, which provides a close approximation to the values produced by the standard and well-accepted binomial model but requires less computation. It combines these models with estimates of the volatilities needed to compute the options prices and then computes projected options prices and portfolio values at various horizons.

[20] The user can control the range of futures prices for which OptionVue displays the projected portfolio values by right clicking on the figure, which brings up a box that allows the user to enter inputs that control the horizontal axis. Alternatively the user can control the range of prices displayed on the horizontal axis using the two scroll bars under the heading "Horiz Axis" on the left-hand side of the exhibit.

Looking over to the vertical axis, one can see that the current value is between negative $140 million and negative $210 million; I calculate it to be negative $166 million.[21]

45. The dotted line that goes through the black dot shows OptionVue's estimates of the February 1 portfolio value for a range of futures prices. For example, it shows that if the futures price suddenly increased by 5% to 2,394.20 the value of the portfolio would decline from its current value of negative $166.3 million to a new value of slightly less than negative $1,050 million; I calculate this new value to be negative $1,067.6 million. The corresponding change in the value is –$1,067.6 million – (–$166.3 million) = –$901.3 million, that is a loss of about $901 million. The Fund's NAV as of the end of the previous trading date, January 31, was approximately $4,012 million. The loss of $901 million represents 22.5% = $901/$4,012 of the previous day's NAV.

46. The other three lines display projections of the portfolio value one, two, and three weeks after February 1, that is on February 8, 15, and 22. For example, the solid line displays the projections of the February 22 portfolio value for the various futures prices. It shows that if the futures price increased by 5%, the February 22 portfolio value is projected to be between negative $1,120 million and negative $1,190.[22] The projection time horizon is controlled by the user by entering a date into the box labelled "Max Proj Date," and the number of lines displayed (representing different dates within the projection time horizon) is controlled by entering a value in the box labelled "Number of Lines."

[21] ¶¶72-100 below describe my OptionVue analysis, which includes exporting the options position values listed in the table below the graph. I calculate the negative $166 million from the exported options position values.

[22] I calculate the projected value to be negative $1,151 million. The change in the value is –$1,151 million – (–$166 million) = –$985 million, that is a loss of $985 million. Using the Fund's January 31 NAV of approximately $4,012 million, the loss of $985 million represents 24.6% = 985/4,012 of the NAV.

47. The bottom of the Analyze screen consists of a table displaying five rows of numbers. These numbers correspond to one of the lines in the graph; the OptionVue user selects the line for which to display the values by clicking either the line on the graph or the appropriate row of the legend overlaid on the graph. The first row consists of the projected portfolio values computed by OptionVue. The other four rows report OptionVue's estimates of the delta, gamma, theta, and vega of the options positions for a range of futures prices.[23]

48. The user controls the volatility using the input box labelled "Volty Chg," which stands for "volatility change." If this box contains "0.0%," as it does in Exhibit 7, OptionVue computes the options values using its internal estimates of volatilities. If this box contains a non-zero value then OptionVue adjusts its volatility estimates using the value entered into the input box, and computes the projected options prices using the adjusted volatility estimates. **Exhibit 8** is an example of the OptionVue Analyze graph in which a value of +10.0% has been entered into the "Volty Chg" input box. In this case, OptionVue increases its volatility estimates by ten points before computing the projected options prices.[24] As in Exhibit 7, the black dot superimposed on the green vertical line represents the current portfolio value. The four lines now show the projected options values for February 1, 8, 15, and 22 under the assumption that the volatilities used to compute options prices increase by ten points.

49. With the higher volatility inputs, the projected prices of all options are greater. However, the Fund holds both purchased and sold options, and the increase in the values of the sold options (which are liabilities) has the effect of decreasing the Fund's NAV. Due to the mix

[23] The S&P 500 futures options have payoffs based on the product of 250 and the S&P 500 index. However, OptionVue computes the deltas, gamma, thetas, and vegas as if the option payoffs were based on the product of 100 and the S&P 500 index. One can obtain the standard deltas, gammas, thetas, and vegas by multiplying those reported by OptionVue by 2.5.

[24] OptionVue will accept a negative entry, for example –5%, in the "Volty Chg" input box. In this case, OptionVue would decrease its volatility estimates by five volatility points before computing the options prices.

of purchased and sold options, the impact of the assumed increase in options volatilities on the Fund's NAV is positive for some values of the S&P 500 index and negative for others. Thus, in some parts of the figure, the values displayed in Exhibit 8 are less than the corresponding values displayed in Exhibit 7, while in other parts of the figures the values displayed in Exhibit 8 are greater than those displayed in Exhibit 7.

50. **Exhibit 9** displays the projected options position values as of 9:00 a.m. on December 7, 2016 for prices of the December 2016 futures contract ranging from 2,096 to 2,320, that is from 5.1% below to 5.1% above the then current futures price of 2,208.25. The exhibit shows that the current value of the portfolio is roughly halfway between zero and negative $60 million; I calculate it to be negative $28 million. The exhibit also shows that if the futures price suddenly increased by 5.1% to 2,320 the value of the options would decline to a new value between negative $960 million and negative $1,020 million; I calculate the new value to be negative $992 million. The resulting change in value is –$992 – (–$28) = –$964 million, that is a loss of $964 million. The Fund's NAV at the end of the previous trading date, December 6, was approximately $4,268 million. Thus, the 5.1% increase in the S&P 500 would result in a loss of $964/$4,268 = 22.6% of NAV.

51. OptionVue can be useful in risk measurement and management precisely because it provides the projections of future position values shown in Exhibits 7–9. These allow the user to estimate how changes in underlying futures prices and options volatilities will impact the value of the options positions across multiple time horizons, and thus allow the user to assess the potential gains and losses on the options positions.

B. Mr. Walczak's Representations about How He Used the OptionVue Computer Program to Assess and Manage the Risks of the Fund's Options Portfolio

52. During the period running from January 2014 through February 2017, Mr. Walczak participated in periodic telephone conference calls ("Open House Calls") with investment advisers during which he provided updates about the Fund and answered questions from interested investment advisers. During these Open House Calls, Mr. Walczak frequently described how he used the OptionVue computer program on a daily basis to assess and manage the risks of the Fund's options positions.[25] Mr. Walczak represented that he used the OptionVue software to manage the Fund to proactively limit (or at least try to proactively limit) drawdowns to approximately 8%.[26] Specifically, he claimed that he used the OptionVue

[25] Mr. Walczak did not refer to the OptionVue computer program by name during the Open House Calls, but rather referred to it as "sophisticated options pricing models" (11/4/2014 Open House Call Tr. at 17:20), "modeling tools" (11/4/2014 Open House Call Tr. at 18:23), "option pricing models" (3/1/2016 Open House Call Tr. at 27:9), "options pricing models" (12/1/2015 Open House Call Tr. at 14:25), "options modelling software" (10/13/2015 Open House Call Tr. at 14:24-25; 15:4-5; 16:15), "options pricing and volatility models" (10/6/2015 Open House Call Tr. at 26:22-23), "fairly extensive portfolio stress testing and modeling" (3/29/2016 Open House Call Tr. at 19:1-2), or "sophisticated options modeling software" (6/7/2016 Open House Call Transcript at 19:14), and "sophisticated modeling tools" (6/7/2016 Open House Call Tr. at 23:2). In his April 4, 2018 investigative testimony he confirmed that OptionVue is the options modelling software that he was referring to during the Open House Calls (4/4/2018 Walczak Investigative Testimony Tr. at 523:11-13 and 626:15-20). In his deposition testimony Mr. Walczak further confirmed that OptionVue was the only options modelling software he used and the only software he used to stress test the Fund's portfolio (7/27/2021 Walczak Deposition Tr. at 33:22-34:14; 41:23-42:2; 150:21-151:7).

[26] The common understanding of the word "drawdown" is that the drawdown is the loss from the high-water mark, where the high-water mark is the highest value ever achieved. For example, if the highest value ever achieved was a per-share NAV of $12.30 and the current per-share NAV is $11.00, the drawdown is $1.30 (= $12.30 – $11.00) per share or $1.30/$12.30 = 10.6%. This is Mr. Walczak's understanding of the term, as he made clear during the 6/7/2016 Open House Call:

> When we talk about a drawdown, Mike, the standard way of defining a drawdown is peak to valley over any time frame; in other words, an 8 percent drawdown from the highest level the fund has achieved until the lowest it ever achieves before it sets a new high. That's the standard industry definition of a drawdown, and that's what we use. So it's not a situation where we're down 8 percent, start over, and we lose another 8 percent next month. No. The goal is to never be more than 8 percent in the hole from your highest ever value, and we've been successful in that since 2007. (6/7/2016 Open House Call Tr. at 24:6-18)

The Fund's high-water mark of $12.30 per share occurred on September 7, 2016.

software to project the Fund's options position values over several time horizons for a range of assumptions about possible changes in the level of the S&P 500 index and options volatilities. Mr. Walczak claimed that if one of his stress scenarios projected a loss greater than his 8% limit, he would hedge the portfolio (i.e., execute options trades) so that the OptionVue analysis of the hedged portfolio would not show any scenarios in which the loss exceeded 8%. In describing his use of OptionVue, he referred to the OptionVue projections as "stress tests," "stress points," or "stresses."[27]

53. For example, during an Open House Call on November 4, 2014, Mr. Walczak stated: "I use risk management to control losses to roughly 8 percent. That's the number I use in stress testing." He further explained:

> So the good news is, I have very sophisticated options pricing models. I plug the portfolio into these models each day. I stress the portfolio for a series of price movements up to 10 percent. I stress the portfolio for volatility movements . . . . So I stress the portfolio for volatility, I stress it for price movement, and then I look over five different time frames. A month from today, two months from today and several time frames in between. I'll vary those time frames to match up to different times that are important to options, expiration for part of the portfolio for example . . . . I identify what's the impact on portfolio value at these stress points. And if the impact is greater than my 8 percent limit, then I'll go in and I'll hedge the portfolio to bring it back in line.[28] (Emphasis added.)

54. During the 9/15/2015 Open House Call, Mr. Walczak was asked to discuss "stress testing on the portfolio." Mr. Walczak's response listed the scenarios he considered, mentioned the 8% drawdown limit, and indicated that when he found scenarios for which the 8% limit was exceeded, he executed trades to bring the potential drawdown back in line with the 8% guideline:

> And the specific scenarios we stress the portfolio value against plus five percent, plus 10 percent price movement in the S&P, minus 5, minus 10 and minus 15. And in the current volatility environment I have added a minus 20 percent price excursion on the S&P to that stress. So we stress those price movements. And

[27] The terminology "stress tests," "stress," and/or "stresses" is common in financial risk management. It refers to the practice of considering a hypothetical scenario, say a 10% decline in the stock market, that might cause losses (or alternatively, gains), and examining the magnitude of the losses (or gains) projected to occur based on the market movement.

[28] 11/4/2014 Open House Call Tr. at 17:20-18:14.

> because options are so sensitive to volatility we also stress volatility movements. With the VIX now already elevated, our normal stress is a 30 VIX and 45 VIX. When the VIX is at 30 we will stress VIX not only at 45 but all the way up to 60. So we stress those. We look across five different time frames and we vary those time frames looking for portfolio values that will exceed our eight percent draw down limit. And when we find that that happens that they'll go in and make position adjustments to bring that potential draw down back into line with our 8 percent guideline which is what we try to hold a draw down to.[29] (Emphasis added.)

55. Mr. Walczak also identified specific stress scenarios in response to a question about stress testing during the 10/6/2015 Open House Call:

> Again, when we do our risks, stresses on the portfolio, we put those, again, we put those together and we say, what happens if price goes up 5, 10, 15 percent? What happens if price is down 5, 10, 15 percent? What happens if volatility spikes? [30]

56. During the 10/13/2015 Open House Call, Mr. Walczak was asked the question "From a risk management perspective, what are you doing at the portfolio level?"[31] In response, Mr. Walczak provided a longer description of his approach that also identified the specific scenarios he examined. His response also included the claim that he carried out the OptionVue analysis on a daily basis, and that he would execute hedge trades if the OptionVue analysis identified a scenario that resulted in a loss greater than 8%:

> So, we're on a daily basis, we'll – the portfolio in aggregate is plugged into our options modeling software and we'll stress price moves of plus 5 and plus 10 percent on the S&P and minus 5, minus 10 and minus 15 percent on the S&P.
>
> We'll then – we'll have snapshots of the portfolio value at those P&L basically, at those stress points. We will then stress volatility in the current environment where we've got a sub 20 VIX. We stress the volatility to a 30 and to a 45. In those environments where VIX is already above 30, we'll stress an additional level up to 60.
>
> So, we now have price and volatility stresses on the portfolio. We look at that across five different timeframes and what we're looking for is a drawdown of greater than 8 percent in the portfolio value. If we find that at any one of those price and volatility stress points, we'll identify whether it, for example, it's price or volatility, which are the two major impacts. On the portfolio we'll identify

[29] 9/15/2015 Open House Call Tr. at 14:9-15:9.

[30] 10/6/2015 Open House Call Tr. at 14:18-22.

[31] 10/13/2015 Open House Call Tr. at 13:16-18.

> what is it that's causing that potential 8 percent drawdown or greater than 8, I'm sorry, that's our line in the sand, so to speak.
>
> We'll identify what is it. Is it price? Is it volatility? We'll then identify what hedging transaction we need to put in place, and normally there's a variety of choices. Via put, via put spread, via call, via call spread, buy back a short call, buy back a short put. Lots and lots of alternatives, but we'll model the most effective alternative to remove that risk excursion and then we'll implement that position on the portfolio.[32] (Emphasis added.)

57. Mr. Walczak also identified the stress scenarios during the 12/1/2015 Open House Call, saying: "And in the S&P fund, we stress plus and minus 5 percent, plus and minus 10 percent, and a minus 15 percent. … And then … we'll stress volatility movements."[33] Shortly thereafter, he referred to the 8% drawdown limit, saying, "once again, we are holding to our eight percent draw-down, which we do in the existing [S&P] fund."[34] He also claimed that he and/or his staff carry out these analyses every day, saying: "We're now doing four risk stressing exercises each day, one in S&Ps and one in each of the markets on the commodities side [that are relevant for the commodities fund]."[35]

58. Mr. Walczak again identified the price scenarios and also mentioned stressing volatility during the 2/2/2016 Open House Call:

> For the S&P fund, a reminder that we do stress market moves of plus 5, plus 10, minus 5, minus 10 and minus 15 percent on a price standpoint. And then we also stress volatility because that, as I have repeated many times, volatility is the most important factor in options pricing. So we are very careful also to stress volatility movement in the fund as well.[36] (Emphasis added.)

[32] 10/13/2015 Open House Call Tr. at 15:3-17:10.

[33] 12/1/2015 Open House Call Tr. at 15:3-9.

[34] 12/1/2015 Open House Call Tr. at 16:12-13.

[35] 12/1/2015 Open House Call Tr. at 19:6-7. "S&Ps" and "S&P fund" refer to the Fund. There was another mutual fund, managed by Mr. Walczak and Kimberly Rios, that traded and held options on commodity futures contracts. Mr. Walczak sometimes referred to the Fund as the S&P fund to distinguish it from this other mutual fund.

[36] 2/2/2016 Open House Call Tr. at 20:18-25.

59. Mr. Walczak also identified the specific scenarios he used during the 3/1/2016 Open House Call:

> We stress price, meaning we look in the model and we draw a graph of the portfolio value and what would happen to the portfolio if the market is up 5 percent or 10 percent. We look to the downside, what would happen to the portfolio if the S&P is down 5 percent, 10 percent or 15 percent. And then in turn we can also at those price stress points say all right, now what will happen if at those price points, volatility declines by 5 percent, increases by 10 percent, increases by 15 percent. So we have a collection of stress points. And what we are looking for at each of those stress points is an 8 percent draw down in the value of the fund.[37] (Emphasis added.)

Then he explained that, if one of the scenarios resulted in a loss of more than 8% of the portfolio value, he would execute options trades until he could no longer find a scenario involving a drawdown greater than 8%:

> We'll model adjustments; we'll chose the most economical and effective adjustment to bring us back in bounds so that we can no longer find a stress point that will result in greater than an 8 percent draw down.[38]

60. During the 3/29/2016 Open House Call, Mr. Walczak said:

> Many of you on the phone have heard my description of our risk management. Our risk management is designed to control our drawdowns to eight percent. … But that's what we control to, and we do that with fairly extensive portfolio stress testing and modeling. Meaning, we'll stress the impact on a portfolio on a daily basis, for five, 10, 15, and sometimes 20 percent price moves, for volatility moves, as high as a VIX of 45 and we do that across many timeframes. And our intention is to, in this case, do like to front run risk and that is to anticipate if - what's the worst possible scenario we might experience and are we sufficiently hedged to limit the drawdown in that scenario to eight percent.[39] (Emphasis added.)

61. During the 6/7/2016 Open House Call, Mr. Walczak again mentioned the 8% drawdown limit, stating, "So the first thing pure and simple is our metrics are dialed in to limit our drawdown to 8 percent."[40] Then after some general discussion of the risk modeling, he indicated the specific stress tests he examined to accomplish this goal, saying that:

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[37] 3/1/2016 Open House Call Tr. at 27:23-25; 28:1-10.

[38] 3/1/2016 Open House Call Tr. at 30:3-6.

[39] 3/29/2016 Open House Call Tr. at 18:19-19:10.

[40] 6/7/2016 Open House Call Tr. at 18:8-9.

> … we do pick stress points, and what we look at is a plus or minus [five] and 10 percent price excursion and also a minus 15 percent excursion because we all know that downside moves can be larger and more rapid, generally speaking, than upside moves. So we look at all these stress points on those curves across time for places in which the portfolio values would cause us an unacceptable drawdown. And so when we identified that there's an unacceptable risk against our 8 percent parameter, we now use that same modeling software to figure out what to do about it.[41]

62. During the same call, Mr. Walczak again explained what he and his staff do when one of the scenarios resulted in a loss of greater than 8%:

> We're stressing the portfolio using some pretty sophisticated modeling tools, and then, when we find an out-of-bounds situation, so to speak, we then jump right back in. We have a whole tool set of risk management antidotes, so to speak, in the form of option contracts and positions we already use to try and make some money. So we jump in and we move our strikes around, and we buy and sell different put options until that risk goes away.[42] (Emphasis added.)

63. Walczak gave a brief summary of the Fund's risk management during the 6/28/2016 Open House Call, again indicating that he would make an adjustment to the portfolio if he observed an OptionVue scenario that exceeded the 8% drawdown limit:

> We then, stress the portfolio across what happens in the market is down 10 percent tomorrow? What happens if the VIX goes from 15 to 40 tomorrow? We do those kind of stresses and we do lots of what if modeling. And that's [how] we're able to understand, oops, if the market does X, we're at risk of exceeding our eight percent drawdown. We need to go in and make a portfolio adjustment. That's a high level of how the risk management works.[43]

64. Several documents show that Mr. Walczak also made similar representations in other settings. In responding to a question from Erina Ford of the firm Raymond James, Mr. Walczak wrote:

> Individual positions are aggregated to an options pricing tool that models portfolio value stressed by +5%/+10%/-5%/-10%/-20%, VIX +10/+20, across 5 time horizons extending to the Portfolio's longest-dated options expiration.

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[41] 6/7/2016 Open House Call Tr. at 21:10-21; audio file for 6/7/2016 Open House Call.

[42] 6/7/2016 Open House Call Tr. at 23:1-8.

[43] 6/28/2016 Open House Call Tr. at 26:15-23.

> Absolute drawdown of 8% from high water requires flattening of risk, no discretion allowed. [44]

65. In an email response to questions from the firm Shepherd Kaplan, Mr. Walczak wrote:

> Portfolio risk stressed daily for price excursion +5%/+10%/-5%/-10%/-20%, volatility excursion VIX =10,=20,=30, time horizon inclusive of longest dated position expiration. Portfolio "stop" at 8% drawdown.[45]

66. An email string from June 11-12, 2015 indicates that, in a conversation with people from BNP Paribas, Mr. Walczak "described in details" a daily risk analysis "based on which the fund is managed to max 8% loss from the worst scenario … this is a stress report with (-15%/-10%/-5%/+5%/+10%) stresses."[46]

67. In summary, Mr. Walczak's representations about how he used the OptionVue software to assess and manage the Fund's risk repeatedly included the following elements:

a. He carried out the OptionVue stress testing on a daily basis.

b. The scenarios he examined included 5% and 10% increases and decreases in the level of the S&P 500 index, and five point decreases and ten point increases in options volatilities.

c. He examined the impact of these scenarios for several different time horizons up to two months in the future.

d. For each scenario he considered, he used the OptionVue software to calculate whether the scenario resulted in a projected loss of more than 8% of the Fund's NAV.

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[44] CFTC3_00032436-CFTC3_00032437, CFTC3_00028255- CFTC3_00028256, and CFTC3_00026577-CFTC3_00026579.

[45] CFTC3_00032463-CFTC3_00032464, CFTC3_00032514, and SEC-CCA-E-0000846.

[46] CFTC3_00030988-CFTC3_00030989.

e. If any scenario involved a loss of more than 8% of the Fund's NAV, Mr. Walczak would execute hedging transactions, that is buy or sell options, to eliminate the possibility of an 8% loss.

68. These representations were very specific. Mr. Walczak explicitly identified the price and volatility stress test scenarios he considered, and clearly stated that if any of the scenarios showed a projected loss greater than 8% of NAV he would hedge the portfolio (that is, execute options trades) so that after the trades none of the scenarios showed a projected loss greater than 8% of NAV. This would make a loss greater than 8% of NAV highly unlikely. Had Mr. Walczak followed the risk management approach he claimed to follow, it would have placed important limitations on the Fund's risk and the Fund's investors would not have suffered the losses they did.

C. Other Representations Made by Mr. Walczak

69. In addition to his representations about his use of OptionVue, Mr. Walczak also represented that, if the Fund did experience a drawdown of 8% of NAV, he would "flatten" the Fund's risk and establish a "neutral exposure" at that point. For example, during the 10/25/2016 Open House Call, in response to the question "It's my understanding that as a goal you shoot for about a maximum draw-down of 8 percent. Specifically what happens to the fund if that were to occur?", Mr. Walczak replied:

> So – and you're correct, that is the goal of our risk management process and protocols. And let me describe a little bit about how that works. So we're not using a standard sort of stop-loss, although if we somehow get to 8 percent – and we have been there actually in the fourth quarter of 2014 – we will flatten that risk at that level. (Emphasis added.)[47]

[47] 10/25/2016 Open House Call Tr. at 30:6-17.

His reply continued, finishing with:

> All that being said, there are times when we hedge, the market keeps coming, we hedge some more, the market keeps coming. When we hit that draw-down, we will go absolutely neutral. It doesn't always mean cash, but it typically means that – a neutral exposure, where whatever the market does, we're not going any lower, and that's – nothing in the business is guaranteed but that's our goal, that's kind of how we approach it.[48]

That is, Mr. Walczak claimed that in the event of an 8% drawdown, he would either liquidate positions or execute hedge trades to eliminate the possibility of any further losses.

70. Mr. Walczak's reply to Erina Ford's email that was quoted in ¶64 included the claim "Absolute drawdown of 8% from high water requires flattening of risk, no discretion allowed."[49] His email response to questions from the firm Shepherd Kaplan that was quoted in ¶65 included the claim that there was a "Portfolio 'stop' at 8% drawdown."[50] Exhibit 85 from Mr. Walczak's 4/3/2018 investigative testimony is a PowerPoint presentation that asserts that the Fund's risk management strategy includes "aggregate portfolio stop loss measures."[51]

71. In addition, Mr. Walczak also represented that he would diversify the Fund's options positions across expiration dates and strike prices. For example, during the 9/29/2015 Open House Call, Mr. Walczak claimed that he would avoid situations in which the expiration dates of the options the Fund held were concentrated in a single month:

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[48] 10/25/2016 Open House Call Tr. at 35:19-36:1.

[49] CFTC3_00032436-CFTC3_00032437, CFTC3_00028255- CFTC3_00028256, and CFTC3_00026577-CFTC3_00026579.

[50] CFTC3_00032464.

[51] See p. 11 of Exhibit 85. Mr. Walczak acknowledged that he developed or authored much of Exhibit 85 (4/3/2018 Walczak Investigative Testimony Tr. at 186:15-188:25), and that "the verbiage is mine" (4/3/2018 Walczak Investigative Testimony Tr. at 188:21). The common understanding of a "stop" or "stop loss" is that it is an order to close out a position in a financial instrument when it reaches a certain price in order to eliminate the possibility of any further loss. While the phrase "stop loss" is not usually applied to a portfolio, in that context the most likely meaning of "stop loss" is to take action, e.g., liquidate or hedge positions, to eliminate the possibility of further losses on the portfolio.

> And we also have some diversification rules around, you know, we have these aggregate position limits for the fund, but we also don't want to have a concentration of positions all in one month so we spread those out.[52]

He provided a more complete explanation of his purported diversification across expiration dates and option strike prices during the 5/24/2016 Open House Call:

> So we make a very conscious effort to diversify the fund's positioning across expiration periods and strike prices. So we don't have the entire fund's portfolio, for example, in June options at 2100 strike. We have 2100 strikes in June, we have 2110 at the end of June, we have 2120 in July, we have 2140 at the end of July, and it goes on like that.
>
> So what happens in practice with the fund's portfolio is any given options expiration period will only introduce volatility to a relatively small part of the fund's portfolio, and then only if it happens to be near the strike prices of those particular options. So as I said, for both risk and return opportunity reasons, we are fairly well diversified in our positioning across many different expiration months and many different strike prices to try and take that volatility out.[53]

Exhibit 85 from Mr. Walczak's 4/3/2018 investigative testimony also includes the claim that the Fund's risk management includes "diversification of time and price exposures."[54]

D. Analysis of OptionVue Projections

72. Exhibits 7–9 discussed in ¶¶44-51 immediately belie Mr. Walczak's claims that he used OptionVue to examine the specified scenarios to identify those in which the projected losses exceeded 8% of the Fund's NAV and then traded options to eliminate the possibility of a drawdown greater than approximately 8%.

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[52] 9/29/2015 Open House Call Tr. at 12:7-10.

[53] 5/24/2016 Open House Call Tr. at 25:8-23.

[54] P. 8 of Exhibit 85. Mr. Walczak acknowledged that he developed or authored much of Exhibit 85 (4/3/2018 Walczak Investigative Testimony Tr. at 186:15-188:25), and that "the verbiage is mine" (4/3/2018 Walczak Investigative Testimony Tr. at 188:21).

73. Exhibit 7 and the loss calculation in ¶45 reveal that an OptionVue analysis carried out on the morning of February 1 would have shown that an immediate 5% increase in the S&P 500 index would result in a projected loss of 22.5% of the Fund's NAV, far greater than the 8% limit.[55] The projected losses at time horizons of one, two, and three weeks are slightly larger than 22.5%. According to Mr. Walczak's representations, he should have executed options trades to hedge the Fund's portfolio in such a way that none of these OptionVue scenarios showed losses greater than 8% of NAV.

74. But the Fund's trade logs show that Mr. Walczak did not execute any trades on February 1. He did not trade until February 9, and the trades he executed on February 9 had little impact on the Fund's risk. In fact, Mr. Walczak did not significantly reduce the Fund's risk until February 13-15.[56] Over the period running from February 1 through 14, the Fund's NAV declined from $10.63 per share on January 31, 2017 to $9.25 per share on February 14, 2017, as the S&P 500 index rose from 2,278.87 on January 31, 2017 to 2,337.58 on February 14, 2017.[57] The $1.38 decline in the per-share NAV represented $1.38/$10.63 = 13.0% of the January 31, 2017 per-share NAV of $10.63. The Fund's per-share NAV continued declining after February 14, falling to $8.68 per share on February 28, 2017. This represented an 18.3% decline from the January 31, 2017 value of $10.63 per share.

75. Exhibit 8 is similar to Exhibit 7 except that it assumes a ten-point increase in volatilities. The projected losses reflected in Exhibit 8 are similar to those reflected in Exhibit

[55] The loss calculation in ¶45 starts from the January 31, 2017 value of the portfolio, not from the high-water mark. On January 31, 2017 the Fund had already experienced a drawdown of 4.3% from the Fund's high-water mark. Thus, the projected 22.5% loss corresponds to a projected drawdown of 26.8% from the high-water mark.

[56] See ¶¶108-111.

[57] All references to and calculations involving the per-share NAV are for the Fund's Class I shares because this was the most numerous share class during the time period relevant to my analysis. See the Catalyst Mutual Fund Series Trust 6/30/2017 Form N-CSR, pp. 75-76.

7. According to Mr. Walczak's representations, he should have also executed options trades so that none of the OptionVue projections displayed in Exhibit 8 showed losses greater than 8% of the Fund's NAV.

76. Exhibit 9 reveals that an OptionVue analysis carried out on the morning of December 7, 2016 would have shown that an immediate 5% increase in the S&P would have resulted in a projected loss of 22.6% of the NAV. A 10% increase in the S&P 500, which is not shown in Exhibit 9, would have resulted in an extraordinary large loss of more than 60% of NAV. But the Funds' trade logs show that Mr. Walczak did not execute any trades on December 7 or 8. Over the course of December 7 and 8, the Fund's per-share NAV declined from $12.07 on December 6 to $11.34 on December 8, that is by 6%, as the S&P 500 index rose from 2,212.23 on December 6 to 2,246.19 on December 8. Mr. Walczak did some trading on December 9, but that trading was not large enough to reduce the Fund's risk significantly. On December 9, the per-share NAV declined another $0.18, to $11.16, as the S&P 500 index rose to 2,259.53. The $0.91 decline over the three-day period from December 6 to 9 was 7.5% of the December 6 per-share NAV. The December 9 per-share NAV of $11.16 represented a 9.3% decline from the September 7, 2016 high-water mark of $12.30 per share.

77. In addition to the two dates December 7 and February 1, I also examined the OptionVue projections on every day in the period running from November 1, 2016 through February 28, 2017, excluding the week of December 12-16, 2016.[58] I carried out the analysis using the following procedure.

[58] The Brattle Group ("Brattle") assisted with some of the analyses in this report at my direction. I did not carry out the OptionVue analysis for the week of December 12-16, 2016 because the OptionVue historical data archive contains incorrect prices for the December 2016 S&P 500 futures contract during that week, and the incorrect prices cannot be changed or overridden by the user. However, Brattle, under my direction, developed a computer program to project the losses based on stress scenarios identified by Mr. Walczak for all trading dates during the period running from November 1, 2016 through February 28, 2017, including the week of December 12-16, 2016, for the same scenarios I used in my OptionVue analysis.

78. First, I used the Gemini valuation statements giving the Fund's options positions, supplemented by the Fund's trade logs, to determine the Fund's trades on each date, and entered the trades into the OptionVue program. I also used OptionVue to exercise the options, as appropriate, and entered the appropriate futures trades to close out any futures positions resulting from option exercises or assignments. The Fund also traded futures contracts and had positions in these contracts toward the end of February 2017, and I entered these futures trades into OptionVue.[59] OptionVue uses the information about trades, exercises, and assignments to determine the Fund's positions on each date.[60]

79. Next, I developed a set of scenarios to consider.[61] The OptionVue scenarios are defined by the time horizon and the assumed change in volatilities. For each time horizon and volatility, OptionVue computes the portfolio value for a range of futures prices specified by the user. I selected time horizons of 0, 7, 14, 21, 30, and 60 days because they cover the range of time horizons that Mr. Walczak said he examined. The OptionVue Analyze function always displays results for the zero day horizon. Thus, if Mr. Walczak used OptionVue at all he saw the results for this time horizon. The other time horizons I selected are consistent with the time horizons Mr. Walczak said he considered on the Open House Calls.

[59] Toward the end of February 2017, the Fund held positions in both the SP and ES futures contracts. According to OptionVue staff, the OptionVue Analyze function cannot display results for a position that combines two different underlying futures contracts. I addressed this by taking advantage of the fact that, except for its smaller size, the economics of the ES contract are the same as those of the SP contract. Specifically, I substituted an equivalent number of SP contracts for each of the ES contracts held by the Fund.

[60] The positions in the Gemini valuation statements do not always agree with the positions computed from the Fund's trade logs. Over the period November 1-9, 2016, the two data sources disagree about the Fund's positions in the February Week 3 calls with strike prices of 2,215 and 2,265. The two data sources also do not agree about the size of a trade in the February 2017 end-of-month calls with a strike price of 2,375 executed on February 17, 2017, and about some trades in the March calls with a strike of 2,400 that were executed on February 27 or February 28. However, the disagreements about the Fund's trades and positions are not large enough to have an important impact on my analysis and do not impact my conclusions.

[61] Mr. Walczak referred to these as "stresses" or "stress tests" on the Open House Calls.

80. I used volatility changes of zero points (that is, no change in volatilities), ten points, and negative five points (that is, a decrease of five points). I chose these scenarios because Mr. Walczak repeatedly mentioned these volatility scenarios during the Open House Calls. Mr. Walczak also regularly mentioned scenarios involving five-point increases and ten-point decreases in volatility. I did not examine the effect of a five-point increase because results for that scenario can be expected to fall between the results for the zero and ten-point scenarios, and thus would not provide additional useful information. I did not consider a ten-point decrease in volatilities because option volatilities were generally low during the period running from November 1, 2016 through February 28, 2017, and at times volatilities of some options were less than ten percent. Because options volatilities cannot be negative, volatilities that are less than ten percent cannot decrease by ten points.

81. Mr. Walczak also sometimes claimed that he carried out stress tests involving volatility increases of 15 points or more. I did not include such large increases in volatility primarily because I restricted attention to the scenarios Mr. Walczak mentioned repeatedly, and there were times when he did not mention such large increases in volatilities when describing his stress test scenarios. In addition, I expected that for most days the losses stemming from a 15-point increase in volatilities would be similar to the losses stemming from a ten-point increase.

82. For each date, I considered all possible combinations of the six time horizons and three volatility changes, for a total of 18 different combinations of time horizon and volatility change.

83. For each combination of time horizon and volatility change, OptionVue computes and displays the projected option position values for a range of prices specified by the user. I considered prices ranging from 10% below to 10% above the current S&P 500

futures price because the price scenarios mentioned by Mr. Walczak always included 5% and 10% price increases and decreases.

84. For each date I considered, and for each of the 18 scenarios, I used the OptionVue Analyze function in conjunction with BackTrader to project the portfolio values for the range of S&P 500 futures prices. The OptionVue Analyze function displays the portfolio values in a small table immediately below the graph. OptionVue allows the user to export these values and save them in a computer file. I did this for each of the 18 scenarios on every trading date during the period running from November 1, 2016 to February 28, 2017, excluding the week of December 12-16, 2016. As I indicated in ¶77, I did not carry out the OptionVue analysis for the week of December 12-16, 2016 because OptionVue's historical data archive contains some incorrect prices during that period.

85. This procedure results in 18 sets of options portfolio values for each of 76 days, a total of 18 ×76 = 1,368 sets of options position values. Each set of options position values covers the range from 10% below to 10% above the then current S&P 500 futures price. I then wrote a computer program in the R statistical programming language[62] that processed the OptionVue output to compute the percentage changes in the value of the Fund's portfolio corresponding to changes in the S&P 500 futures price of –10%, –9%, …, 0%, …., 9%, and 10%.

86. For each date, the current value of the options positions is the value in the scenario corresponding to a time horizon of zero days, a volatility change of zero points (that is, no change), and an S&P 500 futures price change of zero percent (that is, no change). For each

[62] R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: https://www.R-project.org/. The R programming language is widely used by academic researchers in statistics, economics, finance, and other fields.

date and scenario, the gain or loss is the difference between the options position value for the scenario and the current value of the options positions. I computed these gains and losses for each date and scenario and expressed them as a fraction of the Fund's NAV as of the close of trading on the previous date. Through this procedure, the loss is measured from the Fund's current portfolio value, not its high-water mark.

87. I measure the loss starting from the current portfolio value rather than the high-water mark because this corresponds to what Mr. Walczak would have seen when he used OptionVue. OptionVue displays a graph showing options position values for a range of underlying financial instrument prices (in this case, S&P 500 futures prices). Visual examination of the graph allows one to determine the approximate gains or losses, measured from the current value of the options positions, for a range of futures prices. Mr. Walczak testified that this is how he used OptionVue.[63] Thus, my OptionVue analysis corresponds to what Mr. Walczak would have seen when he used OptionVue.[64]

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[63] 10/27/2017 Walczak Investigative Testimony Tr. at 170:7-22; 172:2-19; 259:12-22; 295:5-11; 4/4/2018 Walczak Investigative Testimony Tr. at 627:20-627:6; 641:7-11; 661:21-25; 7/27/2021 Walczak Deposition Tr. at 55:18-56:10; 70:19-25.

[64] In his July 27, 2021 deposition testimony, Mr. Walczak asserted that he used OptionVue to examine the [net] open option premium (7/27/2021 Walczak Deposition Tr. at 74:18-22; 80:22-25; 129:14-17; 173:7-18; 174:22-175:2; 176:6-9). Earlier, he testified that he used OptionVue to examine the potential drawdowns and losses (4/4/2018 Walczak Investigative Testimony Tr. at 639:3-25). The net open option premium can be the same as the net value of the options portfolio, so in many cases the change in the net open option premium is the gain or loss on the options portfolio. Specifically, as long as the horizon of an OptionVue projection does not extend past the expiration date of any of the options in the portfolio, the change in the net open options premium is the gain or loss on the options portfolio.

When the horizon of an OptionVue projection extends past the expiration date of one or more of the options then some gains and/or losses are realized as options are exercised, assigned, or expire. The gains or losses due to option exercises, assignments, and expirations are part of the portfolio gain or loss and are included in the OptionVue projections, but are not part of the open options premium. Thus, Mr. Walczak's assertions in his July 27, 2021 deposition testimony that he used OptionVue to examine the open option premium can be correct only if he restricted his attention to OptionVue horizons that did not extend past the expiration date of any of the options the Fund held. But Mr. Walczak earlier testified that he used OptionVue to examine horizons out to several months (7/27/2021 Walczak Deposition Tr. at 44:19-24). Mr. Walczak's July 27, 2021 testimony that OptionVue shows the total open option premium (7/27/2021 Walcak Deposition Tr. at 176:10-18) also is incorrect for OptionVue horizons that extend past the expiration date of any of the options the Fund held.

88. The loss measured from the current portfolio value is always less than or equal to the drawdown measured from the high-water mark, because the high-water mark is the highest value ever achieved. This makes my OptionVue analysis more conservative than the high-water loss measurement described by Mr. Walczak. For example, at the close of trading on December 6, 2016 the drawdown was already 1.9%.[65] Thus, a projected 6.1% loss computed using OptionVue would have corresponded to a potential future drawdown from the September 7, 2016 high-water mark of 6.1% + 1.9% = 8%. At the close of trading on January 31, 2017, the Fund investors had already experienced a 4.3% drawdown from the high-water mark. At that point, a projected 3.7% loss computed using OptionVue would have corresponded to a potential drawdown of 8%.[66]

89. **Exhibit 10** is a time-series graph that displays the estimated losses resulting from 5% and 10% increases in the S&P 500 futures price when the time horizon is zero days and there is no change in option volatilities. The dashed blue line shows the percentage loss on each date resulting from a 5% increase in the S&P 500 futures price. The solid red line shows the percentage loss on each date resulting from a 10% increase in the S&P 500 futures price. [67]

Mr. Walczak also seemed to testify that the open option premium is a good approximation to the drawdown because the Fund "enter[s] positions at even," that is at a net cost of approximately zero (7/27/2021 Walczak Deposition Tr. at 129:4-9). This is correct only if (a) the horizon of the OptionVue projection does not extend past the expiration date of any of the Fund's options, and (b) there has not been an option expiration date since the Fund entered the options positions. If there has been an option expiration date then gains or losses due to option exercises, assignments, and expirations will be reflected in the drawdown but not in the open option premium.

[65] The Fund achieved its high-water mark on September 7, 2016, when he NAV was $12.30 per share. On December 6, 2016, the NAV was $12.07 per share and the drawdown was $0.23 (= $12.30 – $12.07) per share or $0.23/$12.30 = 1.9%

[66] In this case, the drawdown is not just the percentage difference between the January 31, 2017 and September 7, 2016 per-share NAVs because the investors received a distribution on December 16, 2016 that must be reflected in the calculation of the drawdown. I calculated the drawdown by cumulating the Fund's daily returns from September 7, 2016 through January 31, 2017. This calculation shows that an investor who purchased a Fund share on September 7, 2016 would have experienced a loss of 4.3% of his or her investment by January 31, 2017. This 4.3% loss is the drawdown as of January 31, 2017.

[67] For several days toward the end of February 2017, the losses are negative and not shown. These negative losses are gains, as the loss and the gain are the negative of each other.

The thin dashed black line marks the location of an 8% loss. Exhibits 10-13 do not show results for December 12-16 because I was not able to carry out the OptionVue analysis for that week, as explained above.

90. The exhibit shows that 5% or 10% increases in the S&P 500 futures price would have resulted in losses greater than 8% of NAV on most of the 76 days I examined. A 5% increase in the S&P 500 futures price would have resulted in a loss greater than 8% of NAV except during the first part of November and the second half of February. A 10% increase in the S&P 500 futures price would have resulted in a loss greater than 8% of NAV except during the second half of February. Some of the losses displayed in the figure are extremely large. For example, on December 9, 2016, a 5% increase in the S&P 500 futures price would have resulted in a loss of approximately 39% of NAV. On the same date, a 10% increase in the S&P 500 futures price would have resulted in a loss of approximately 85% of NAV. OptionVue automatically displays the results for a range of time horizons, including the zero-day horizon, and the scenarios of no change in volatilities and a 5% or 10% increase in the S&P 500 are scenarios that Mr. Walczak repeatedly said he considered during the Open House Calls. Thus, Mr. Walczak would have seen these projected losses or similar ones had he used OptionVue on a daily basis in the way he repeatedly described.

91. As indicated above, these projected losses are measured starting from the current portfolio value and thus understate the drawdowns from the high-water mark. For example, as indicated in ¶88 the drawdown was already 1.9% on December 6, 2016. Thus, the projected drawdown would be 1.9% greater than the OptionVue projected loss. If Mr. Walczak was managing the portfolio as he claimed, he should have stress tested to identify projected losses of 6.1% (= 8.0% – 1.9%) to ensure that the sum of the existing drawdown of 1.9% and the OptionVue projected loss did not exceed 8%. At the close of trading on January 31, 2017 the

drawdown was 4.3%, and Mr. Walczak should have stress tested to identify projected losses of 3.7% (= 8.0% – 4.3%) or greater to ensure that the sum of the existing drawdown of 4.3% and the projected loss would not exceed 8%.

92. By February 9, 2017, the Fund had experienced an 8.3% drawdown from its high-water mark. Based on his representations about flattening risk and going neutral in the event of an 8% drawdown, Mr. Walczak should have acted to eliminate the possibility of future losses.

93. **Exhibit 11** is similar to Exhibit 10 except that it displays the results for a time horizon of 30 days and no change in option volatilities. As in Exhibit 10, the dashed blue line displays the percentage loss on each date resulting from a 5% increase in the S&P 500 futures price and the solid red line displays the percentage loss resulting from a 10% increase in the futures price. The losses shown in Exhibit 11 are similar to but slightly smaller than those shown in Exhibit 10 because in general the passage of time benefited the Fund's options positions. Similar to Exhibit 10, the graph shows that on most of the days I examined the OptionVue stress testing described by Mr. Walczak would have resulted in projected losses greater than 8% of NAV for scenarios involving 5% or 10% increases in S&P 500 futures prices combined with a time horizon of 30 days.

94. **Exhibit 12** shows the results for a time horizon of zero days and a ten-point increase in volatilities. For December 2016 and January 2017, and especially for February 2017, when the Fund experienced the largest losses, the losses shown in this exhibit are similar to those in Exhibit 10 (which assumes no volatility change). This indicates that during these months, and especially during February 2017, the risk of increases in the S&P 500 index was the primary risk to which the Fund was exposed. For November 2016, the losses displayed in Exhibit 12 are somewhat larger than those shown in Exhibit 10, because during this period the

Fund's portfolio was such that the risk of increases in volatility was also important. Due to this, Exhibit 12 shows that a 5% increase in the S&P 500 results in losses greater than 8% of NAV throughout November 2016. Thus, the exhibit shows that a 5% or 10% increase in the S&P 500 futures prices combined with a ten-point increase in volatilities would have resulted in a projected loss greater than 8% of NAV on every day except during the second half of February.

95. **Exhibit 13** shows the results for a time horizon of 30 days and a ten-point increase in option volatilities. The results are similar to those shown in Exhibit 12, with a difference being that the losses shown in Exhibit 13 are generally slightly smaller than those shown in Exhibit 12. Nonetheless, a 10% increase in S&P 500 futures prices combined with a time horizon of 30 days and a ten-point increase in volatilities would have resulted in a loss greater than 8% of NAV on every day except during the second half of February. The same is true if the scenario is modified to include only a 5% increase in S&P 500 futures prices, though the losses are only very slightly greater than 8% on November 3 and 4, 2016.

96. Exhibit 11 and 13 differ in that Exhibit 13 assumes a ten-point volatility increase and Exhibit 11 does not. The losses shown in these two exhibits are similar for December 2016 and January 2017, and especially for February 2017 when the Fund experienced the largest losses. This indicates that during these months, and especially during February 2017, the risk of increases in the S&P 500 index was the primary risk to which the Fund was exposed.

97. **Exhibit 14** consists of a table summarizing the results of all of the scenarios I considered for the 76 days I analyzed using OptionVue. For each combination of volatility change (0, +10, or –5 points), S&P 500 futures price change (10%, 5%, 0%, –5%, or –10%), and time horizon (0, 7, 14, 21, 30, or 60 days), it shows the percentage of days for which OptionVue projected losses exceed 8% of NAV. For scenarios involving no change in volatilities and futures price increases of 5%, the OptionVue projected losses exceed 8% of

NAV on between 73.7% and 78.9% of the days, depending on the time horizon. If the futures price is assumed to increase by 10%, the OptionVue projected losses exceed 8% of NAV on 88.2% of the days, regardless of the time horizon. On the other hand, if the futures price change is either –5% or –10%, there are no days on which the OptionVue projected loss exceeds 8% of NAV.

98. If the volatilities are assumed to increase by ten points and the futures price is assumed to increase by 5% or 10%, the OptionVue projected losses exceed 8% of NAV on between 78.9% and 93.4% of the days, depending on the futures price change and the time horizon. There are also days on which the OptionVue projected losses exceed 8% of NAV, even if the futures price does not change. These days are concentrated in November and early December 2016, when the Fund had significant exposure to the risk of changes in volatilities. If volatilities are assumed to decrease by five points and the futures price is assumed to increase by 5% or 10%, the OptionVue projected losses exceed 8% of NAV on between 67.1% and 88.2% of the days, depending on the futures price change and the time horizon.

99. My OptionVue analyses are consistent with what Mr. Walczak knew or should have known about the Fund's risk from an email Kimberly Rios sent to Mr. Walczak on Saturday, December 10, 2016.[68] In her December 10 email, Ms. Rios stated that a 1% increase in the S&P 500 would cause the Fund to lose 5% of its NAV. At the time she sent her December 10 email, the most current information available in OptionVue would have been from December 9. My calculations show that at the close of trading on December 9, a 1%

[68] The December 10, 2016 email from Ms. Rios to Mr. Walczak is Catalyst_005_0118107, and was Exhibit 46 of the 2/23/2018 Rios Investigative Testimony.

increase in the S&P 500 would have caused the Fund to lose about 5.7% of its NAV.[69] As of 9:00 am on December 9, a 1% increase in the S&P 500 index would have caused the Fund to lose about 5.5% of its NAV.

100. My OptionVue analyses are also consistent with the deltas computed by Michael Schoonover, and emailed to Mr. Walczak, during the period running from January 31, 2017 through February 28, 2017.[70] **Exhibit 15** reports the Schoonover deltas, the corresponding OptionVue deltas, and the approximate deltas computed from the OptionVue scenarios of 1% increases and decreases in the S&P 500 futures price, for the period running from January 31, 2017 through February 28, 2017. For each date, the Schoonover deltas are calculated using settlement prices from the previous trade date, while the OptionVue deltas and approximate deltas are computed using prices from 9:00 am central time on the date. Despite the differences in time, these three sets of deltas are similar. Whether viewed in isolation or in combination, the three deltas convey the same message that the Fund was very risky during the period running from January 31, 2017 through February 24, 2017, and risky on February 27 and 28, 2017. The Schoonover deltas should have prompted Mr. Walczak to investigate the Fund's risk and then act to reduce it.

E. Scenario Analyses Outside of OptionVue

101. The calculations carried out by OptionVue are standard calculations regularly carried when examining the risks of an options portfolio. To verify that OptionVue performs the calculations in a manner consistent with my expectations, I repeated several of the calculations described above outside of OptionVue. Specifically, I imported the Fund's option

[69] One should not expect my calculations to match exactly that of Ms. Rios because the exact result of the calculation depends on the market prices used in the calculation, and I do not know the prices used in Ms. Rios' calculation.

[70] The Schoonover deltas are in Exhibit 21 (SEC_01_0000750) of the 4/12/2021 Schoonover Deposition.

position information into the R statistical programming language and computed the value of these instruments using daily settlement prices provided by the CME for each of the products. I then used standard R option valuation functions to project the portfolio losses under the same scenarios I used in my OptionVue analysis.[71]

102. To carry out a scenario analysis on a particular date, I computed the change in portfolio value relative to the end-of-day (i.e., computed using settlement prices) portfolio value arising from specified shifts in S&P 500 futures prices, changes in option volatilities, and/or a reduction in the time remaining until option expiration. To estimate the changes in portfolio value, I computed for each option its implied volatility (a valuation input) which, when combined with the observed futures price and interest rate, leads the appropriate option valuation function to compute the observed settlement value of the option as its value. Then I applied the specified changes in futures price, volatility, and/or time horizon associated with the scenario to the option valuation inputs and recalculated the options values. The difference between the portfolio value using the modified inputs and the observed portfolio value is my estimate of the change in value in that scenario. The projected loss is the negative of the change in the value.

103. **Exhibit 16** shows a comparison between the impact of a 5% increase in futures prices computed in OptionVue with the same scenario analysis carried out in R. In the exhibit, the blue points represent the projected losses calculated by OptionVue on each trading day using market prices at 9:00 am on that day including all trading positions as of the prior

[71] These calculations were carried out by Brattle at my direction. I used the "Black76Option" function to compute values of European options on futures (EV and EV3 options) and I used the "BSAmericanApproxOption" function to compute values of American options on futures (SP options). Both functions are provided as part of the R fOptions package ("Rmetrics - Pricing and Evaluating Basic Options").

evening's close.[72] For comparison, the orange lines represent the projected losses calculated in R each trading day including the trading positions as of the prior evening's close. The darker orange line uses the day's closing prices and the lighter orange line uses the prior day's closing prices – the good agreement between them shows that the timing of the price quotes across the trading day does not appreciably change the projected losses. Likewise, the good agreement between the OptionVue and R calculations shows that the choice of tool (OptionVue or R) used to carry out the calculations does not meaningfully change the projected losses.

104. As described above, Mr. Walczak claimed that he routinely used OptionVue to estimate the risk to the portfolio from 5% and 10% futures price increases, changes in implied volatility, and the time decay of option value associated with a reduction in the time until expiration. **Exhibit 17** shows risk (projected losses) on each day (calculated in R) for scenarios representing all combinations of (a) increasing the futures price by 5% or 10%, (b) increasing option volatilities by ten points, and (c) reducing the time to expiration by one month (21 trading days).[73] It is immediately apparent from the exhibit that the impacts fall naturally into three distinct groups determined solely by the futures price change. The group of yellowish curves clustered tightly together all have a 10% futures price increase, the group of blue-green curves clustered together all have a 5% futures price increase, and the reddish curves at the bottom reflect only changes to the option volatility and the time to expiration. In other words, it is immediately apparent that the key risk during this time period is from possible changes in futures prices.

[72] The blue points are missing during the week of December 12-16 because, as discussed previously, I was not able to carry out the OptionVue analysis for those dates.

[73] In this figure, the projected losses are computed using the prior day's settlement prices applied to the options positions as of the prior day's close (i.e., as if running the analysis before trading each morning using the prior evening's settlement prices).

105. As described above, Mr. Walczak repeatedly stated he would trade to reduce risk whenever one or more of his stress test scenarios showed a projected loss greater than 8%. Further, he stated that he would consider scenarios with 5% and 10% increases in futures prices, and ten -point increases in option volatilities. Exhibit 17 shows that there were multiple scenarios for which the projected loss exceeded 8% of the Fund's NAV for every day during the period running from November 1, 2016 through February 14, 2017. As discussed previously, these calculations of the Fund's projected losses are conservative because on each date I measure the loss starting from the current portfolio value, whereas Mr. Walczak represented that he sought to limit the drawdowns from the Fund's high-water mark.

F. Analysis of the Fund's Trading

106. As discussed in ¶¶52-68, Mr. Walczak repeatedly represented that he used the OptionVue computer program to analyze a number of scenarios of possible changes in the S&P 500 futures price and options volatilities. Mr. Walczak further represented that if any such scenario involved a drawdown of more than 8% he would execute hedging transactions, that is buy or sell options, to eliminate the possibility of an 8% drawdown.

107. The scenarios Mr. Walczak purportedly considered included 5% and 10% increases in the futures price. My analysis shows that, if option volatilities do not change and the time horizon is less than or equal to 14 days, a 5% increase in the futures price would lead to a projected loss in an amount greater than 8% of NAV on any day from November 10, 2016 through February 14, 2017.[74] A 10% increase in the futures price would lead to a projected loss in an amount greater than 8% of NAV on any day from November 1, 2016 through February

[74] When the time horizon is 21 or 30 days, the projected loss on November 11, 2016 is slightly less than 8% of the Fund's NAV. When the time horizon is 60 days, the losses on November 11-16, 2016 are less than 8% of NAV.

14, 2017, regardless of the time horizon. Thus, based on his representations, Mr. Walczak should have been executing options trades to eliminate the possibility of an 8% loss on every day during the period running from November 1, 2016 through February 14, 2017. He did not. In fact, Mr. Walczak did not trade on 22 of the 72 trading days during the period running from November 1, 2016 through February 14, 2017. He did not trade on 20 of the 65 trading days during the period running from November 10, 2016 through February 14, 2017.

108. **Exhibit 18** shows Mr. Walczak's trades increased rather than reduced the projected losses on many of days when he did trade. The first panel of Exhibit 18 shows the projected losses resulting from a 5% increase in the futures price on every day during the period running from November 1, 2016 through February 28, 2017, for a horizon of zero days and assuming no change in volatilities.[75] As indicated in the previous paragraph, a 5% increase in the futures price would lead to a projected loss of an amount greater than 8% of NAV on any day from November 10, 2016 through February 14, 2017. The second panel shows whether Mr. Walczak's trades had the effect of increasing or decreasing the projected loss resulting from a 5% futures price increase.[76] In particular, the red (blue) bars indicate days on which the trades decreased (increased) the projected loss resulting from a 5% futures price increase.

109. The results in the second panel show that Mr. Walczak did not trade to reduce risk on most of the days on which he traded. During the period running from November 10, 2016 through February 14, 2017, Mr. Walczak's trades either increased or did not change the projected loss, due to a 5% futures price increase, on 31 of the 45 trading days on which he did

[75] During the last few days of February 2017, the losses are negative, that is a 5% future price increase would have resulted in a gain.

[76] For each date, the change in risk is calculated by first calculating the projected losses assuming that the Fund did not trade on the date, that is using the options positions the Fund held at the close of trading on the previous trading date, and then recalculating the projected losses after including the day's trades in the Fund's options positions.

trade. He traded in a way that would reduce risk on only 14 of the 45 days on which he traded. Also, taking account of the days on which he did not trade at all, Mr. Walczak traded in a way that would reduce risk on only 14 of the 65 days during the period running from November 10, 2016 through February 14, 2017. Furthermore, it was not until February 14, 2017 that his trades had the effect of bringing the projected loss down below the 8% threshold. Up until that time, even on the days when his trades reduced risk, his trades were not large enough to bring the projected loss down below the 8% threshold. Only the trades during December 9-14, 2016 and February 13-15, 2017 significantly reduced the projected losses, and the trades on December 9-14, 2016 did not bring the projected losses down below the 8% threshold.[77]

110. The third panel shows the value that an investor who held one share of the Fund on November 1, 2016 and maintained that position through February 28, 2017 would have on each date during the period. From November 1, 2016 through December 15, 2016, the figure shows the per-share NAV. The Fund made a distribution of $1.08 per share to its investors on December 16, 2016, and this distribution is part of the value that an investor would have on December 16 and subsequent days. Thus, starting on December 16, 2016, the figure shows the sum of the per-share NAV and the $1.08 distribution.

111. This panel shows that there were two periods of striking declines in the per-share NAV, December 6-9, 2016 and February 8-24, 2017. A comparison of the third panel to the first two panels shows that Mr. Walczak traded to reduce risk December 9-14, 2016, that is *after* the December 6-9, 2016 decline in per-share NAV was well underway. The same comparison shows that Mr. Walczak traded to reduce risk during February 13-15, 2017, again

[77] The projected losses declined from November 18 to November 21, 2016, and from January 20 to January 23, 2017, due to option expirations, not Mr. Walczak's trading.

after the February 8-24, 2017 decline in per-share NAV was well underway. Thus, Mr. Walczak's trades that significantly reduced the Fund's risk took place only after the Fund's investors had already suffered significant losses.

112. The Fund's positions were concentrated in the February Week 3 and February end-of-month (EOM) options throughout December 2016, January 2017, and early February 2017, which contributed to the Fund's risk. **Exhibit 19** shows the percentages of the Fund's positions in different expirations for several dates between November 30, 2016 and February 15, 2017. On November 30, 2017, 28.3% and 18.2% of the Fund's options positions were in February Week 3 and February EOM call options, respectively. These percentages were larger than the percentages of options having any other expiration date. The concentration of the Fund's positions in the February Week 3 and February EOM options increased during December 2016 and January 2017. At the close of trading on January 31, 2017, 46.8% and 41.8% of the Fund's options positions consisted of February Week 3 and February EOM call options, respectively. An additional 2.9% of the Fund's options positions consisted of February EOM puts. Thus, on January 31, 2017, more than 91% of the Fund's options positions consisted of options expiring in the second half of February.

113. Mr. Walczak did not trade between February 1 and February 8. Thus, the Fund's positions were still concentrated in February Week 3 and EOM call options on February 8, just before the Fund's share price began collapsing on February 9. On February 9, Mr. Walczak sold 7,000 February Week 3 calls and purchased 7,000 February EOM calls, but this substitution of EOM options for Week 3 options did not change the Fund's concentration in the February options. Mr. Walczak reduced the Fund's positions in the February Week 3 options on February 10, 13, 14, and 15, but even so the Fund's positions were still concentrated in the

February options on February 15, shortly before the expiration of the February Week 3 options.

114. **Exhibit 20** shows that the Fund's sold call options were also concentrated in a limited range of strike prices as of the close of trading on February 8. The Fund had sold large numbers of February Week 3 options with strike prices between 2,260 and 2,285. The sold February EOM options were also concentrated in a limited, though slightly larger, range of strike prices, while the Fund had sold March options with strike prices of 2,290 and 2,295. At 9:00 am on February 9, the futures price of the March contract was 2,296, so at this time these sold call options were either in-the-money or just slightly out-of-the-money. As a result, the prices of these options were very sensitive to changes in the S&P 500 index. This concentration of the Fund's sold call options in a limited range of strike prices, together with the concentration in the February expirations, helps explain why the Fund was so risky during the first half of February 2017.

G. Further Analyses

1. Were the Periods when the Fund Suffered Losses Unusual?

115. As described above, the key risk factor for the options portfolio during most of the period running from November 1, 2016 through February 28, 2017 was the risk of rising S&P 500 futures prices with relatively little risk associated with changes in volatility. Further, the large losses in early December 2016 and in mid-to-late February 2017 were during periods of a rising S&P 500 Index. The SEC staff asked me to examine the question of whether the increases in the S&P 500 during the periods of loss were unusual.

116. As a preliminary answer, I note that the S&P 500 index increased by 2.1% (from 2,212.2 to 2,259.5) over the three-trading-day period from December 6, 2016 to December 9, 2016 and it increased by 3.2% (from 2,294.7 to 2,367.3) over the 11-trading-day period from

February 8, 2017 to February 24, 2017. Both of these increases are considerably smaller than the 5% and 10% price increases Mr. Walczak repeatedly claimed he stressed for using OptionVue.

117. Second, I computed the percentage change in the S&P 500 index over every three and 11-trading-day interval from January 2010 through October 2016, a period during which Mr. Walczak was actively trading. I then compared the distribution of historic percentage changes with the observed changes over the three-trading-day period December 6-9, 2016 and the 11-trading-day period February 8-24, 2017. **Exhibit 21** shows the results of this analysis. Over the January 2010 through October 2016 period, 8% (about one in 13) of the three-trading-day percentage changes exceeded the change during December 6-9, 2016. A total of 14% (about one in seven) of the 11-trading-day percentage changes exceeded the change during February 8-24, 2017. In other words, shifts in the S&P 500 index during the years leading up to the Fund's option portfolio losses show that the magnitudes of price movements during December 6-9, 2016 and February 8-24, 2017 were not unusual.

118. The analysis also shows that percentage changes in the S&P 500 index of at least 5% over periods of 11 trading days (approximately two weeks) were not unusual. Approximately 3% of the 11-trading-day percentage changes in the S&P 500 index equal or exceed 5%. Recognizing that there are typically about 252 trading days in a year, there are about 23 = 252/11 non-overlapping 11-day periods each year. Based on the historical data, there is a high probability that one will see an 11-day return of at least 5% in a year. A competent portfolio manager should be prepared for such returns. Mr. Walczak repeatedly represented on Open House Calls and otherwise that he was prepared for such returns because he stress tested scenarios involving 5% and 10% returns in OptionVue.

2. Statistical Analysis of Changes in the Fund's Per-share NAV

119. **Exhibit 22** graphically shows the relation between the Fund's per-share value (the red line) and the S&P 500 index (the black dashed line) during the period running from November 1, 2016 through February 28, 2017. Prior to December 16, 2016, the red line is the Fund's per-share NAV. On December 16, the Fund paid its investors a distribution of $1.08 per share, which is part of the value of an investor's investment. On and after December 16, the red line shows the sum of the per-share NAV and the $1.08 distribution.

120. During the first half of November, the Fund's NAV had relatively little relation to the S&P 500 because the Fund's options position did not have a large exposure to changes in the value of the S&P 500 index. Starting with the middle of November, Exhibit 22 shows that the Fund's per-share NAV falls as the S&P 500 index rises, and then in the first few days of December the Fund's per-share NAV rises as the S&P 500 falls. Then the Fund's value falls sharply during December 6-13 as the S&P 500 rises sharply. After that, from January through the end of February, it is clear that changes in the Fund's per-share value move inversely with changes in the S&P 500. The inverse relation between the two series is quite striking—it is obvious that the Fund has a significant directional bias starting in early December 2016.

121. Confirming the visual impression, the Fund's NAV returns were highly negatively correlated with percentage changes in the S&P 500 index during the period running from December 1, 2016 through February 28, 2017. The correlations between the Fund's NAV returns and percentage changes in the S&P 500 were –0.85, –0.86, and –0.88 during December 2016, January 2017, and February 2017, respectively. Further, starting from early December 2016 the percentage changes in the Fund's per-share value are large relative to the percentage changes in the S&P 500 index.

122. I further explored the relation between the Fund's returns and the S&P 500 index by examining the volatility of the Fund's per-share NAV returns during the period running from November 1, 2016 through February 28, 2017, and compared the volatility of the Fund's NAV returns to the return volatility of the S&P 500 index. The results are in **Exhibit 23**. This exhibit reports both the volatility of the Fund's NAV returns and the return volatility of the S&P 500 index during each of the months November 2016, December 2016, January 2017, and February 2017. The fourth column reports the ratio of the Fund's NAV return volatility to the return volatility of the S&P 500 index for each month. The last column reports the correlations mentioned in the previous paragraph.

123. The results in Exhibit 23 show that the Fund's returns were much more volatile than those of the S&P 500 index during December 2016, January 2017, and February 2017. During these three months, the ratios of the return volatility of the Fund to that of the S&P 500 index were 3.35, 3.97, and 5.25. These ratios indicate that during these three months the Fund's returns were 3.35 to 5.25 times more volatile than the returns on the S&P 500 index. The S&P 500 index measures the value of a diversified stock portfolio. Thus, the Fund's returns were 3.35 to 5.25 times more volatile than the returns on a diversified stock portfolio. In addition, the correlations show that the Fund's returns were highly negatively correlated with the returns on the S&P 500 index. Such high levels of volatility and negative correlations are inconsistent with the Fund's stated purpose of "capital appreciation and capital preservation in all market conditions, with low volatility and low correlation to the US equity market."[78] Rather, the Fund was very risky, highly volatile, and highly negatively correlated with the S&P 500 index during December 2016, January 2017, and February 2017.

[78] Catalyst Hedged Futures Strategy Fund Summary Prospectus (November 1, 2016), p. 1.

124. Next, I use regression analysis to estimate the relation between the Fund's returns during the period running from November 1, 2016 through February 28, 2017, and the returns of the S&P 500 index and percentage changes in the VIX, which is an index of options volatilities. Regression analysis is a statistical technique that is widely used to estimate the relation between one or more explanatory variables and a dependent variable to be explained. I regressed the Fund's returns on the returns of the S&P 500 index and percentage changes in the VIX for each of the months November 2016, December 2016, January 2017, and February 2017.[79] The results of the regression analysis are reported in **Exhibit 24**. They show that the Fund was very risky starting from December 2016, and that the Fund's returns were inversely related to (that is, negatively correlated with) the movements of the S&P 500 index.

125. The left-hand side of the exhibit displays the results when the only explanatory variable is the S&P 500 return. When the S&P 500 return is the only explanatory variable, the estimated coefficients for December 2016, January 2017, and February 2017 are –2.84, –3.41, and –4.62. The interpretation of these regression coefficients is that the Fund's return tends to move in the opposite direction from the S&P 500 return, and by between 2.84 and 4.62 times as much, depending on the period. The R^2 coefficients ranging from 71.8% to 77.3% indicate that the S&P 500 return explains between 71.8% and 77.3% of the variance of the Fund's NAV returns. The negative signs and large magnitudes of the regression coefficients imply that the Fund was highly negatively correlated with the S&P 500 index and very risky during December 2016 through February 2017.

[79]The regression equation is $r_F = a + b \times r_{S\&P} + c \times r_{VIX} + \varepsilon$, where r_F is the return on the Fund's Class I shares, $r_{S\&P}$ is the percentage change in the S&P 500 index, and r_{VIX} is the percentage change in the VIX..

126. The right-hand side of the exhibit displays the results when the regressions include two explanatory variables, the S&P 500 return and the percentage change in the VIX. The coefficients on the S&P 500 return remain negative, and are slightly larger in magnitude than those in the left-hand side of the exhibit. The estimated coefficients for December 2016, January 2017, and February 2017 are now –3.28, –4.20, and –4.70. The coefficients on the percentage change in the VIX are small. The R^2 coefficients when both explanatory variables are included (displayed on the right-hand side of the exhibit) are only slightly larger than the R^2 coefficients when the S&P 500 return is the only explanatory variable (displayed on the left-hand side of the exhibit).

127. These results indicate that from December 2016 through February 2017 the Fund's returns were explained primarily by the S&P 500 returns, and changes in volatility as captured by the VIX contributed little to the Fund's returns. This is consistent with the conclusion in ¶96 and ¶104 that the Fund's risk and losses were primarily due to its exposure to changes in the S&P 500 index and that changes in option volatilities contributed little to the Fund's risk or its losses.

3. The Fund's Risk Parameters

128. In addition to the stress testing he described during the Open House Calls with investment advisers and in other interactions with investors' representatives, Mr. Walczak also

received on a daily basis a report of purported "Risk Parameters."[80] The table below reproduces part of the report for December 5, 2016 and lists each risk parameter and its associated metric.[81]

Risk Parameter	Metric
Strategy: Markets Traded	No positions in markets outside of S&P 500 Futures
Strategy: Futures Positions	No futures positions open overnight
Risk: Margin to NAV ratio	SPAN Margin (exchange minimum) to NAV ratio less than 60%
Risk: Margin to NAV ratio	Actual Margin to NAV ratio less than 80%
Risk: Open Options premium value - Calls	Less than 6% NAV net calls
Risk: Open Options premium value - Puts	Less than 6% NAV net puts value
Risk: Position limits- Calls	Should be less than or equal to 50
Risk: Position limits- Puts	Should be less than or equal to 60
Risk: Change in NAV per share-Week	5% in 1 week
Risk: Change in NAV per share-Month	8% in 1 month
Put Ratio	Must be Greater than or equal to 1

[80] 4/3/2018 Walczak Investigative Testimony Tr. at 47:11-13; see also 10/27/2017 Walczak Investigative Testimony Tr. at 138:6-8. These risk reports were intended for a Catalyst risk manager located in New York who was not an options expert and not part of the portfolio management team (10/13/2015 Open House Call Tr. at 16:8-17:9). Mr. Walczak used the OptionVue stress tests in the internal management of the Fund (10/13/2015 Open House Call Tr. at 14:21-16:10). See also 2/27/2017 Open House Call Tr. at 49:15-25.

[81] See Exhibit 41 (Catalyst_005_0104962-Catalyst_005_0104963) from Mr. Walczak's 4/3/2018 investigative testimony. Exhibit 44 (Catalyst_005_01115626-Catalyst_005_01115629 from Mr. Walczak's 4/4/2018 investigative testimony contains the same risk parameters. Exhibit 17 (SEC_01_00003055) from Mr. Walczak's 4/3/2018 investigative testimony and Exhibit 5 (Catalyst_003_52514) from his 10/27/2017 investigative testimony are earlier versions of the risk report. CFTC3_00021504 is a version of the report for May 29, 2015 that was provided to the National Futures Association (NFA) as part of an NFA examination of Catalyst. Mr. Walczak testified about Catalyst_005_0104962-Catalyst_005_0104963 in his April 3, 2018 investigative testimony (4/3/2018 Walczak Investigative Testimony Tr. at 45:23-66:5). He testified about Exhibit 44 (Catalyst_005_01115626-Catalyst_005_01115629) in his 4/4/2018 investigative testimony (4/4/2018 Walczak Investigative Testimony Tr. at 558:24-574:12). SEC_01_00003055 is identical to Catalyst_003_0305. Mr. Walczak testified extensively about Catalyst_003_0305 in his October 2017 investigative testimony (10/27/2017 Walczak Investigative Testimony Tr. at 107:5-168:25).

These "Parameters" are not meaningful risk measures. A meaningful risk measure provides information either about potential future losses or about how the portfolio will perform under certain market conditions. None of the parameters listed in the table do this.[82]

129. The first two parameters "No positions in markets outside of S&P 500 Futures" and "No futures positions open overnight" do not provide any information about potential losses on the Fund's options positions or how those positions will perform in possible market scenarios. They also do not place any limit on the risk of the Fund's options positions.

130. The third and fourth parameters "SPAN Margin (exchange minimum) to NAV ratio less than 60%" and "Actual Margin to NAV ratio less than 80%" do not restrict the potential future losses of the Fund in any meaningful way, as a Fund that meets this condition can be risky due to purchased options that require no margin. This metric also does not provide any information about how the Fund will perform under possible future market conditions.[83] The required minimum margin can be large because the Fund has sold put options, and will suffer losses in the event of a market decline; or because the Fund has sold call options, and will suffer losses if the S&P 500 index increases; or because the Fund has sold both put and call options and will suffer losses if the market either increases or decreases; or because the Fund

[82] Mr Walczak acknowledged this during his October 2017 investigative testimony (10/27/2017 Walczak Investigative Testimony Tr. at 168:16-25):

> MR. SHANK: So none of the risk parameters in Exhibit 5 attempt to estimate or calculate the potential risk exposure in the portfolio; is that right?
> THE WITNESS: Let me take another look before I answer the question. No, none of these are attempting to forecast what loss might happen under certain conditions.

[83] Mr. Walczak acknowledged this during his October 2017 investigative testimony (10/27/2017 Investigative Testimony Tr. at 111:19-25):

> Q: Does the margin risk metric, specifically does the requirement that the theoretical minimum margin be less than 80 percent of AUM, tell you anything about how the fund will perform under certain market conditions?
> A: No.

has entered into a large hedged options position that will require it to make a large payment to the clearinghouse regardless of market conditions.[84]

131. Mr. Walczak testified that the fifth and sixth parameters requiring that the Open Options premium value of both call and put positions be less than 8% of NAV were intended only to apply when the net options position consists of sold options.[85] These parameters also do not provide any information about potential future losses or how the Fund will perform under certain market conditions. The net open options premium value can be large because the Fund has sold put options, and will suffer losses if the S&P 500 index declines; or because it has sold call options, and will suffer losses if the index increases; or because the Fund has sold both put and call options and will suffer losses if the index either increases or decreases.

132. Regarding the seventh and eighth parameters, an earlier version of the risk report clarifies that these position are per $1 million of NAV.[86] Position limits of 50 call option or 60 put option contracts per $1 million of NAV also do not provide information about how the Fund will perform under certain market conditions. These provisions limit the Fund's risk, but not in any meaningful way. If a standard S&P 500 futures call (put) option is well in-the-money its delta will be close to 250 (negative 250); that is, its value will increase (decrease) by approximately $250 if the S&P 500 increases by one index point, and will decrease (increase) by approximately $250 if the S&P 500 decreases by one index point. The value of a position

[84] This parameter limits the Fund's potential payments to the futures clearinghouse because the clearinghouse sets margins so that the margins will equal or exceed an investor's obligations to the clearinghouse with very high probability. Thus, if the Fund complies with the 60% limit on the margin then one can be confident that the Fund's obligations under its options contracts will not exceed 60% of the Fund's NAV. This is not a meaningful limit on the Fund's risk.

[85] In testifying about an earlier version of the risk report, Catalyst_003_0305, Mr. Walcak clarified that the open option premium was relevant only when the net options positions were short positions. See 10/27/2017 Walczak Investigative Testimony Tr. at 113:15-115:23.

[86] CFTC3_00021504.

consisting of 50 (60) well-in-the-money call (put) options will change by approximately $12,500 = 50 × $250 ($15,000 = 60 × $250) if the S&P 500 moves by one index point, where the relation between the change in value and the index movement will be positive for purchased calls and sold puts and negative for written calls and purchased puts. Historically, a typical daily move in the S&P 500 index is about one percent of the index value. During the period running from November 1, 2016 through February 2017, the index was between 2,085.18 and 2,369.75, so a one percent change in the index was greater than 20 index points. If a one point change in the index results in a gain or loss of about $12,500 ($15,000), a 20 point change would result in a gain or loss of about 20 × $12,500 = $250,000 (20 × $15,000 = $300,000). If the Fund had similarly risky positions in both puts and calls then a 20 point change in the S&P 500 index would cause the value of a position consisting of 50 sold (purchased) well in-the-money calls and 60 purchased (sold) well-in-the-money puts to increase or decrease by $250,000 plus $300,000 = $550,000 per each $1 million of NAV. Thus, a restriction to 50 call and 60 put options contracts restricts the possible loss from a typical daily move to about 55% of NAV. This is not a significant restriction on the possible losses. In fact, recognizing that index movements larger than the typical daily movement are possible over a one-day period, and likely over a longer period of say one week, based on this restriction losses of 100% of NAV are possible.

133. The ninth and tenth parameters restricting the maximum drawdowns are not meaningful risk metrics because they do not provide any information about potential future losses or how the Fund will perform under certain market conditions. They can reasonably be read as expressing the wish that drawdowns of five and eight percent not occur, but this does not make them risk parameters. Meaningful drawdown risk parameters would not simply express the wish that losses not occur.

134. The eleventh parameter, the put ratio, also does not restrict the risk because it does not place any limit on the size of the put positions.

135. None of these risk parameters, either individually or in the aggregate, serve as a stop-loss that would limit drawdowns to approximately 8% (or to any other level).

IV. CONCLUSIONS

136. Mr. Walczak repeatedly represented that he used OptionVue to estimate the possible losses to the Fund in certain scenarios. He further represented that when the OptionVue results showed that one or more of the scenarios involved a loss of more than 8% of the Fund's NAV, he would execute options trades to eliminate the possibility of a loss greater than 8%. Based on these analyses, and on my knowledge of and experience with the financial markets, I have formed the following opinions:

a. The OptionVue analyses Mr. Walczak represented he carried out would have projected losses exceeding 8% of the Fund's NAV on every day during the period running from November 1, 2016 through February 14, 2017. On most days during this period, there were scenarios in which the projected losses were far in excess of 8% of the Fund's NAV.

b. Mr. Walczak did not trade on 22 of the 72 trading days during the period running from November 1, 2016 through February 14, 2017 when there were scenarios in which the projected losses exceeded 8% of the Fund's NAV.

c. For most of the days for which the losses in one of more of the scenarios exceeded 8% of the Fund's NAV and Mr. Walczak traded options, his trades had little impact on the Fund's risk. There were only two periods when Mr. Walczak executed trades that significantly reduced the Fund's risk,

December 9-14, 2016 and February 13-15, 2017. Both of these periods were shortly *after* the Fund suffered significant loses. Thus, these trades were not executed proactively in anticipation of avoiding those losses.

d. My calculations of the Fund's projected losses are conservative because on each date I measure the loss starting from the current portfolio value, whereas Mr. Walczak represented that he sought to limit the drawdowns from the Fund's high-water mark.

e. Contrary to his representations, Mr. Walczak did not act to "flatten" or eliminate the Fund's risk when the drawdown reached 8% on February 9, 2017.

In addition:

f. None of the other risk parameters that Mr. Walczak purportedly used in addition to the OptionVue scenarios were forward-looking or prospective, and they did not meaningfully measure the Fund's risk. None of them, either individually or in aggregate, served as portfolio stop-loss measures.

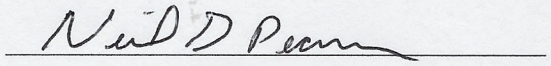
g. The periods in December 2016 and February 2017 during which the Fund experienced large losses were not periods of unusual or extreme market movements.

h. The Fund's risk was inconsistent with the stated investment objective of "capital appreciation and preservation in all market conditions, with low volatility and low correlation to the US equity market."[87] Rather, the Fund was extremely risky, highly volatile, and highly negatively correlated with

[87] Catalyst Hedged Futures Strategy Fund Summary Prospectus (November 1, 2016), p. 1.

the S&P 500 index during December 2016, January 2017, and February 2017. Mr. Walczak knew or should have known this.

137. My work in this matter is ongoing, and I reserve the right to supplement this analysis in the future.



NEIL D. PEARSON, PH.D.

Dated: August 31, 2021